May 31, 2017

Central Cascades Wilderness Strategies Project

Deschutes and Willamette National Forests

Existing Conditions and Trends by Wilderness Area

Summary of Central Cascades Wilderness Areas

Introduction

This document presents the current conditions for visitor management-related parameters in three themes: social, biophysical, and managerial settings. Conditions are described separately for each of the five wilderness areas included in the Central Cascades Wilderness Strategies Project. Trends are assessed within each wilderness area and are based on monitoring data gathered primarily between 2011 and 2016.

The five wilderness areas addressed in this report are Mt. Jefferson Wilderness, Three Sisters Wilderness, Mt. Washington Wilderness, Diamond Peak Wilderness, and Waldo Lake Wilderness. The first four wilderness areas are co-managed by the Deschutes National Forest and the Willamette National Forest. The Waldo Lake Wilderness is managed entirely by the Willamette National Forest.

Comprehensive planning for visitor use management in the Central Cascades Wilderness areas through the NEPA process has not occurred since the early 1990s. A 1991 Decision Notice authorized the creation of a self-issue permit system across the Mt. Jefferson, Mt. Washington, and Three Sisters Wilderness Areas. The non-regulatory permit system was intended to improve education of visitors and to collect data on numbers of visitors and the types and areas of use. Wilderness permits are required from Memorial Day until October 31st. The 1991 NEPA also initiated the formation of a wilderness focus group, which would look at the permit data collected through two seasons and then make recommendations on management strategies. The wilderness focus group developed an implementation plan that detailed a number of actions that were subsequently implemented in 1995: prohibiting campfires in certain locations, use of designated campsites in certain locations, limiting use in selected high-use areas, and wilderness

education. The current management setting for each wilderness area is based on that implementation plan. Over the years, Districts have made minor modifications to the limited entry areas in order to make them more effective. These are outlined in the following descriptions of the management situation for each wilderness area.

In 2000, the "State of the Wilderness" report found that actions were successful primarily due to ongoing interaction with the public (USDA Forest Service 2000). Limited entry areas (LEAs) resulted in fewer visits; and camp fire prohibitions and designated campsites were found to be successful measures but all depended on wilderness rangers having a presence, making contacts, and removing fire rings.

Overall Use Trends

Use trends have been documented using data collected from free, mandatory wilderness permits that are available at wilderness trailheads. Number of visitors from 2011 to 2016 were adjusted for compliance percentage, based on wilderness area and year. Compliance percentages were calculated using Wilderness Ranger Contact Reports for an entire season, creating an average compliance based on number of people contacted and number of people that have permits.

These free permits have been used on a regular basis starting in 1991 for the Three Sisters, Mount Jefferson, and Mount Washington Wilderness areas. The Diamond Peak Wilderness started to use the permit system in 2006, but only at trailheads located on the Deschutes National Forest. Permit stocking on the Willamette National Forest side of the Diamond Peak Wilderness has not been consistent and those numbers have not been included in this report. The Waldo Lake Wilderness has not routinely stocked permits at trailheads, so there is limited data for this area.

While there have been years that no data was collected (specifically 2008, 2009, and 2010), or times when a specific trailhead has no data, overall there is a large quantity of data that can establish use trends in these wilderness areas. Amount of visitors and length of stay can vary from year to year because of factors such as the length of the season due to heavy spring snow pack, seasonal wildfires, unseasonably wet weather, and early snowfall in the autumn.
Data from wilderness permits has shown that overall visitor use trends across the project area has shown tremendous increases in the past six years. Figure 1 and Figure 2 compare the number of visitors to four of the wilderness areas from 2011 to 2016.[1] 2015 and 2016 saw the greatest increases in visitors. Three Sisters Wilderness is displayed separately from the others because visitation there is on such a larger scale.

[1] This document discusses visitation trends by looking at the number of visitors (number of people) who enter the wilderness. It does not account for visitor use days, which is the number of visitors multiplied by the number of days they stay.

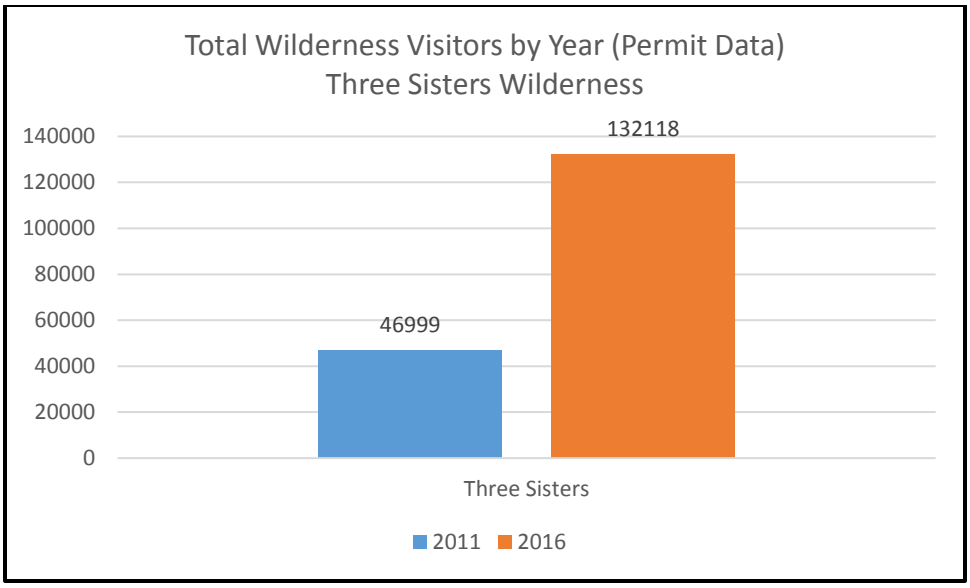


Figure 1: Comparing the number of people visiting the Three Sisters Wilderness in 2011 to 2016. The area saw an increase of 181%.

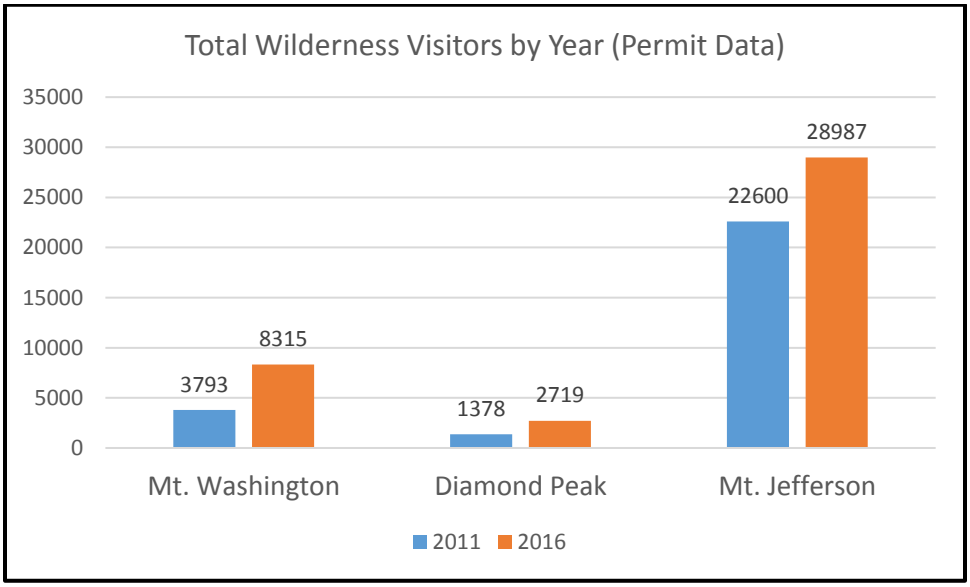


Figure 2: From 2011 to 2016 the number of people in the Mt. Washington Wilderness increased 119%; the Diamond Peak Wilderness increased 97% (eastside access only); and the Mt. Jefferson increased 28%.

The number of groups per wilderness area has been increasing as well, which correlates with the increase in visitor use. There are standards and guidelines in the forest plans for the Deschutes and Willamette National Forests which describe how many encounters are appropriate in certain areas, counting an encounter with one group –regardless of group size-as one encounter (see Table 32 under Appendix A - Wilderness Solitude Monitoring). Figure 3 compares the number of groups visiting each wilderness area in 2011 to 2016.

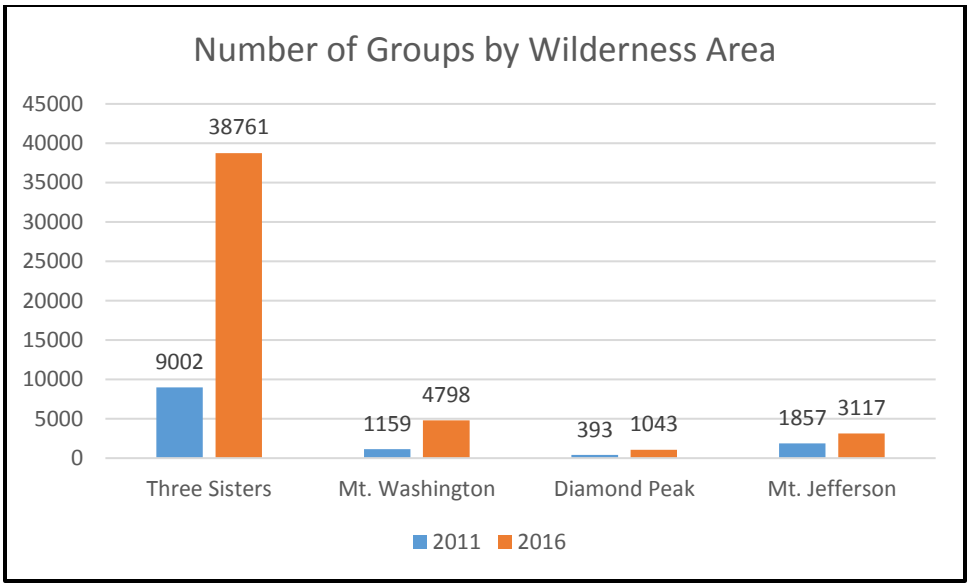


Figure 3: From 2011 to 2016, the number of groups entering the Three Sisters increased by 331%; Mt. Washington by 314%; Diamond Peak by 165%; and Mt. Jefferson by 68%.

While the past six years have shown significant increases in visitor use, the trend has been underway since the early 1990s when wilderness permits were first required. Figure 4 shows the increase in use in the Three Sisters Wilderness that has been occurring since 1991.

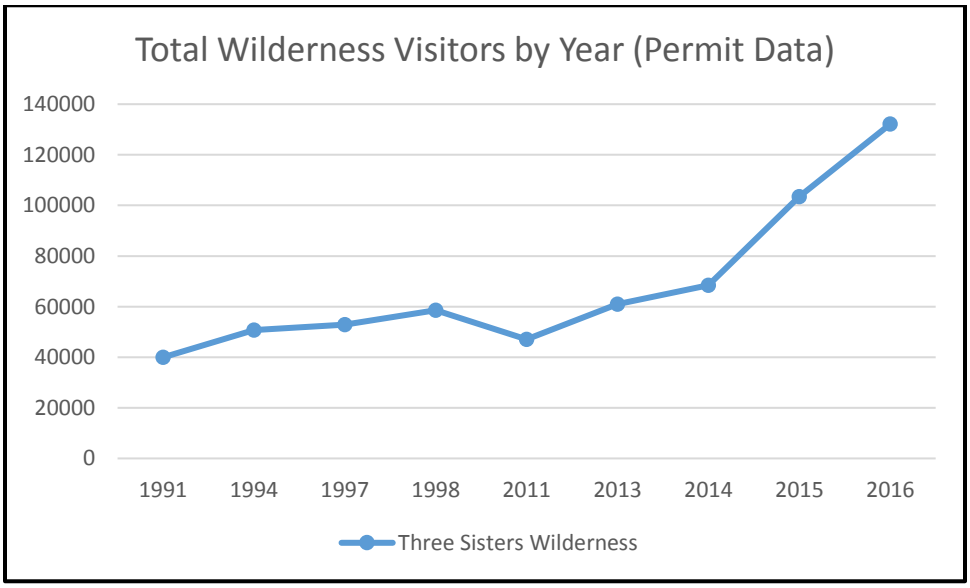


Figure 4: Between 1991 and 2016, use in the Three Sisters Wilderness Area has increased 231%.

In 2016, day use accounted for between 41% (Mt. Jefferson) and 70% (Diamond Peak) of visitation. Within each wilderness area, the day use varies widely by trailhead.

Pacific Crest Trail

The Pacific Crest Trail is a 2,659 mile long trail that starts in California, on the border with Mexico and ends in Washington, on the border with Canada. In the project area it travels along the Cascade Crest, through the Diamond Peak, Three Sisters, Mt. Washington, and Mt. Jefferson Wilderness areas. Use has been increasing on this trail and more visitors are attempting to complete this trip in a summer.

Visitors who hold a Pacific Crest Trail Permit do not need a Wilderness Permit while travelling through the wilderness areas. While there is a count of PCT hikers who complete the entire trail as they report it to the Pacific Crest Trail Association, there is not a reliable count of those who only do sections of it. Table 1 shows the number of hikers who completed the hike from 2011 to 2016; these numbers have not been included in the final numbers for use in the wilderness areas.

Table 1: Number of hikers that reported completing the Pacific Crest Trail by year.

Year	2011	2012	2013	2014	2015	2016
Number of People	156	432	273	425	527	685

Outfitters and Guides

There are several outfitters and guides that operate in the Three Sisters, Mt. Washington, and Mt. Jefferson Wilderness areas. These companies and organizations have allocated 'use days' which allows them to operate in wilderness under a special use permit administered by the Deschutes and Willamette National Forests. A 'use day' counts the number of days that each individual is in the wilderness. As an example, 2 people in the wilderness for 3 days amounts to 6 'use days' (Table 2).

Table 2: 2016 use days for all outfitters in wilderness.

Outfitter	Allocated Use Days	Actual Use Three Sisters	Actual Use Mt. Washington	Actual Use Mt. Jefferson
Bend Parks & Recreation	300	64	13	26
Central Oregon Community College	200	17	5	23
Halligan Ranch Llamas	210	36	0	80
Lewis & Clark College	100	0	0	10
NW Outward Bound School	4600	1849	242	825
OMSI	300	95	50	0
OSU Cascades	400	161	0	0
Portland Parks & Recreation	242	0	0	60

Timberline Mountain Guides	230	142	20	34
Three Sisters Backcountry	500	370	0	0
U of O Outdoor Pursuits Program	285	162	0	0
Wilderness Ventures	150	108	0	0

Figure 5: Fire ring and scar in high elevation area.

Solitude Monitoring

Oregon State University conducted Solitude Monitoring in the Three Sisters, Mt. Jefferson, and Mt. Washington Wilderness areas from 1991-1993 and then again from 2013-2014. The number of travel encounters rates between 1991-93 and 2013-14 varied from inconsequential to substantial depending on the specific monitoring area (Hall and Engebretson 2015). Additionally, the monitoring does not capture the significant increases in use that has occurred in some areas in 2015 and 2016. The results do match permit data that the Forest Service has been collecting. Travel encounters greatly increased in some areas such as Green Lakes, there were more moderate increases in others areas, and some areas remained stable or decreased. Hall and Engebretson also used the monitoring data to check for conformity to Forest Plan standards and guidelines. See Appendix A for more information.

Continuation of Trends

These trends in use increases can be expected to continue, although the rate of growth is unknown. The population growth rate in Oregon between 2010 and 2016 was 6.8% which is above the national average of 4.7%. The population forecast for the State of Oregon shows an expected 19% increase over the current population in 2026. Of the counties where the wilderness areas are located, Deschutes County has the highest growth rate by far at 14.9% over the same time period (www.census.gov). The population increase is also an increase in the visitor base for the central Cascades wilderness areas.

In addition to population increases, shoulder season use of the outdoors has been growing. Shoulder season use may increase even more given the potential for climate change which could result in longer seasons where high elevation areas are accessible. Research by Fisichelli, et al.

(2015) indicates that climate change may alter visitation patterns, resulting in increased visitation pressure across most of the year and especially during the shoulder seasons in high-latitude and high-elevation protected areas.

Other factors that may maintain the increasing trends are ongoing promotion of outdoor recreation by public land management agencies, ongoing tourism advertising by local, regional, and state entities, and social media.

Biophysical Setting

The increase in use that has been occurring in these Wilderness Areas has a direct impact on the biophysical environment. Recreation impacts are exemplified by the number and size of campsites, social trail networks, trash left in the backcountry, fire rings built, structures built (ex. cabins, wind walls, lean-tos), and exposed human waste that has not been buried. While there are numbers to go along with each of these, it is important to realize that instances of the above-mentioned impacts are related to wilderness ranger presence and may vary by year depending on number of staff on the ground, the areas where rangers are focusing their patrols, wildland fires, and other priorities that take precedence.

Figure 6: Trash in the Snow Creek drainage of the Three Sisters Wilderness.

Recreation-related use has been demonstrated to result in the destruction of vegetation and soil communities, soil compaction, erosion, sedimentation of streams/lakes, contamination of water sources, and tree damage.

Some of the associated impacts with increased visitor use, campsites, and social trails are difficult to quantify without in-depth on-site studies. That given, visitor use has been shown to change wildlife behavior, effect plant species/density, and cause long term effects to riparian areas. Recreation use by people, dogs, and horses all have impacts to the wilderness resource

While there are no studies that have been completed in the wilderness areas evaluated in this document, there is broad scientific understanding that effects exist. Larson et al (2016) systematically reviewed scientific literature and analyzed 274 articles on the effects of non-consumptive recreation on wildlife. The articles spanned all geographic areas, taxonomic groups, and recreation activities. Larson et al (2016) state, "Recreation is a leading factor in endangerment of plant and animal species on United States federal lands (Losos et al, 1995), and is listed as a threat to 188 at-risk bird species globally (Castley, 2013). Effects of recreation on animals include behavioral responses such as increased flight and vigilance (Mainini et al, 1993; Naylor et al, 2009); changes in spatial or temporal habitat use (George and Crooks, 2006; Rogala et al, 2011); declines in abundance, occupancy, or density (Reed, 2008; Banks and Bryant, 2007; Heil et al, 2007); physiological stress (Arlettaz et al, 2006; Mullner et al, 2005); reduced reproductive success (Beale and Monaghan, 2005; Finney et al, 2005); and altered species

richness and community composition (Kangas et al, 2010; Riffell et al, 1996). Many species respond similarly to human disturbance and predation risk, meaning that disturbance caused by recreation can force a trade-off between risk avoidance and fitness-enhancing activities such as foraging or caring for young (Frid, 2002)."

Campsites

Campsite proliferation in these wilderness areas has created damage to resources in some areas due to amount of barren core, tree damage, and vegetation trampling. Farrell et al (2001) stated, "…camping related impacts to vegetation and soils have been well documented, and many wildernesses have programs to monitor and/or limit such impacts. Impacts of specific concern include increased mineral soil exposure, loss of soil organic material, changes in soil moisture and density, loss vegetation cover, alteration of species composition, and damage to trees (Marion and Cole, 1996; Stohlgren, 1986)."

According to the Deschutes Land and Resource Management Plan (1990), "Campsites should be separated from other campsites and set back from trails, meadows, lakes, and streams at least 100 feet." Campsites can negatively affect the biophysical environment by destroying plant and soil communities, damaging riparian zones if camps are too close to water, creating large areas of compacted soil called 'barren core' zones of camps, and potentially increasing erosion, negatively affecting the natural character of the wilderness. Additionally, one of the largest impacts campsites have is on the outstanding opportunities for solitude or a primitive and unconfined type of recreation The Wilderness Act defines wilderness areas as areas "…which generally appear(s) to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable…." Campsites, and particularly associated structures such as benches and fire rings, are a constant reminder of the human impact to wild areas. In this way, the proliferation of these visual reminders has a big impact to wilderness character.

Campsite maps which demonstrate campsite proliferation in the wilderness have been developed and will help management and decision makers to better understand what areas of the wilderness have the highest levels of human impact and signs of human habitation. A comprehensive campsite inventory that involved searching 95% of areas likely to have camping impacts was completed by wilderness rangers in 2010 and 2011. Using the data collected, a summary impact rating has been developed that accounts for the area of vegetation impacted by camping, the amount of barren core in each site, and the amount of trees damaged in each site. Campsites are rated between 1 and 9, with 1 being the least and 9 being the most impacted sites

User-Created Trail

User-created trails (also referred to as "social" trails) are defined as trails that have not been surveyed, designed, and constructed, but rather created by users over time as they continue to use the same route to get to a destination or place of interest. User-created trails in many of the wilderness areas have been increasing in both number of trails, and size of the trail tread. Many of these networks have grown in size and scope, not only as a result of the general increase in visitor use, but also due to concentration of use in specific areas because of social media. Previous areas that were "secret spots" are now on the web with pictures and directions.

User-created trails invite to areas that were historically seldom visited by recreationists. Increasing use in these areas has the potential to disturb vegetation, compact soil, and displace wildlife. Trampling and removal of vegetation are normally the first results of trail development

(Wilson and Seney, 1994). Trampling has the potential to increase the bulk density of the soil, which decreases soil porosity. This change to porosity can affect the moisture content, aeration, and availability of nutrients in soil, which promotes additional loss of vegetation along trail corridors (Liddle and Greig-Smith, 1975; Weaver and Dale, 1978; Kuss, 1983; Hall and Kuss, 1989; Kuss and Hall, 1991). Once vegetation is lost, soil erosion becomes the primary problem when water is not redirected off the tread (Cole, 1987).

Figure 7: Braided user-created trails on north side of Broken Top.

Since user trails have never been designed, they tend to take the most direct route, which is often straight up fall lines or along the bottoms of drainages. This type of trail alignment has been demonstrated to encourage erosion and increase sedimentation of riparian areas. Studies show that there is a positive correlation between slope gradient and soil loss, which signifies that an increase in trail grade will have an increase on erosion (Wischmeier and Smith, 1978; Leonard and Plumley, 1978; Coleman, 1981). With no design parameters in place, user created trails are likely to fail and become unusable. Rather than abandoning a route, recreationists tend to travel adjacent to the old trail, creating another user trail next to the old one.

In addition to these soil effects, user created trails can also negatively impact wildlife. Marion and Leung (2001) state, "Trails, and the presence of visitors, also impact wildlife, fragment wildlife habitat and cause avoidance behavior in some animals and attraction behavior in others to obtain human food (Hellmund, 1998; Knight & Cole, 1991). While most impacts are limited to a linear disturbance corridor, some impacts, such as alterations in surface water flow, introduction of invasive plants, and disturbance of wildlife, can extend considerably further into natural landscapes (Kasworm & Monley, 1990; Tyser & Worley, 1992). Even localized disturbance can harm rare or endangered species or damage sensitive resources, particularly in environments with slow recovery rates."

The more miles of social trails in a wilderness area, especially those that are more extensive will have a direct correlation to an increase in the potential for natural resource damage.

The Deschutes and Willamette National Forest partnered with Oregon State University to establish a minimum protocol for identifying, classifying, and mapping user-created trails in 2016. Mapping these routes is useful because an inventory can provide a comprehensive picture of where problems exist, which can be useful for project planning and supporting management decisions (D'Antonio and Hall 2016). It is also useful for monitoring long-term resource conditions and management actions, to indicate how conditions are improving or degrading over time (D'Antonio and Hall 2016).

During the 2016 field season, a comprehensive project was completed to map social trails in the Mt. Washington and Diamond Peak Wilderness Areas. Mt. Jefferson and Three Sisters Wilderness Areas are identified to have social trails systematically mapped in the upcoming

2017 field season. Social trails were mapped in the Three Sisters and Mt. Jefferson Wilderness during the field seasons from 2010-2011, but it was not comprehensive. The new minimum protocol established in 2016 was designed so that the previous data could be easily incorporated into the new system.

While the minimum protocol established by D'Antonio and Hall (2016) addresses trail width, trail class, presence of human waste, and primary use of the trail, this document will focus on trail class as it directly relates to resource damage on the biophysical setting. The following trail classes were defined by D'Antonio and Hall (2016) and have been used for all mapping exercises with user-created trails (Table 3).

Table 3: Definition of Condition Class for User-Created Trail Inventory.

Condition Class	Definition
Class I	Slight loss of vegetation relative to undisturbed adjacent areas; no soil disturbance or erosion. Lowest level of ecological impact for this ecosystem.
Class II	Significant vegetation loss compared to undisturbed adjacent areas, but some vegetation remaining in tread; no soil disturbance or erosion. Moderate amount of ecological impact for this ecosystem.
Class III	Complete loss of vegetation compared to surroundings, and/or soil disturbance or erosion obvious **and significant**. Highest amount of ecological impact for this ecosystem.

Mount Jefferson Wilderness

Social Setting

General Visitor Characteristics and Trends

The Mt. Jefferson Wilderness Area covers 108,959 acres. There are five glaciers located along the peaks of the 10,497 foot mountain. Elevations begin around 5,000 feet where fir, hemlock, pine, and cedar trees mix with vine maple and huckleberries amid more than 150 lakes. The high country above 7,000 feet is open, with scattered trees, alpine meadows, and talus slopes. Twenty-one trailheads provide access to the 184 miles of trails within this wilderness area, including 33 miles of the Pacific Crest Trail (PCT).

While the Mt. Jefferson Wilderness has not experienced some of the tremendous overall increases that other wilderness areas have shown, there are high use areas such as Jefferson Park (primarily Whitewater, Breitenbush Lake, and South Breitenbush trailheads) and Canyon Creek Meadows (Jack Lake Trailhead) which are facing increasing visitor use and displaying the upward trend in visitation. Table 4 shows the number of visitors from 2011-2016 at each trailhead, excluding 2012 because it does not have accurate information for that year. Figure 8 shows the visitor use graphically.

Table 4: Total visitors by trailhead within the Mt. Jefferson Wilderness Area 2011 – 2016.

Mt. Jefferson	2011	2013	2014	2015	2016
Bear Valley	101	51	40	135	79
Cabot Lake	1,774	1,103	481	1,618	1,415
Jack Lake	3,970	3,022	3,331	5,262	7,188
Jefferson Lake	349	89	100	315	823
Round Lake	400	305	317	267	449
Big Meadows HC	151	123	21	51	77
Bingham Ridge	33	97	14	96	95
Breitenbush Lake	319	786	1,008	1,444	No data
Cheat Creek	92	96	86	89	115
Crown Lake & Roaring Creek	378	399	600	545	477
Duffy Lake	1,678	1,931	3,555	2,125	2,223
Marion Lake	3,668	2,596	3,517	2,605	3,159
Maxwell Butte	256	85	199	222	172
Minto Mt	8	no data	no data	no data	13
Pamelia Lake	2,010	no data	no data	no data	no data
PCT Santiam Pass	3,703	1,717	2,701	3851	3,680
Pine Ridge & Turpentine	678	356	1,166	337	2,028
South Breitenbush & Crag	517	305	665	761	1,647
Triangulation & Triangulation Peak	599	1,024	1,204	1181	915
Whitewater	1,675	2,655	3,764	4224	4,198
Woodpecker Ridge	244	187	306	294	235
Totals	**22,600**	**16,927**	**23,075**	**25,424**	**28,988**

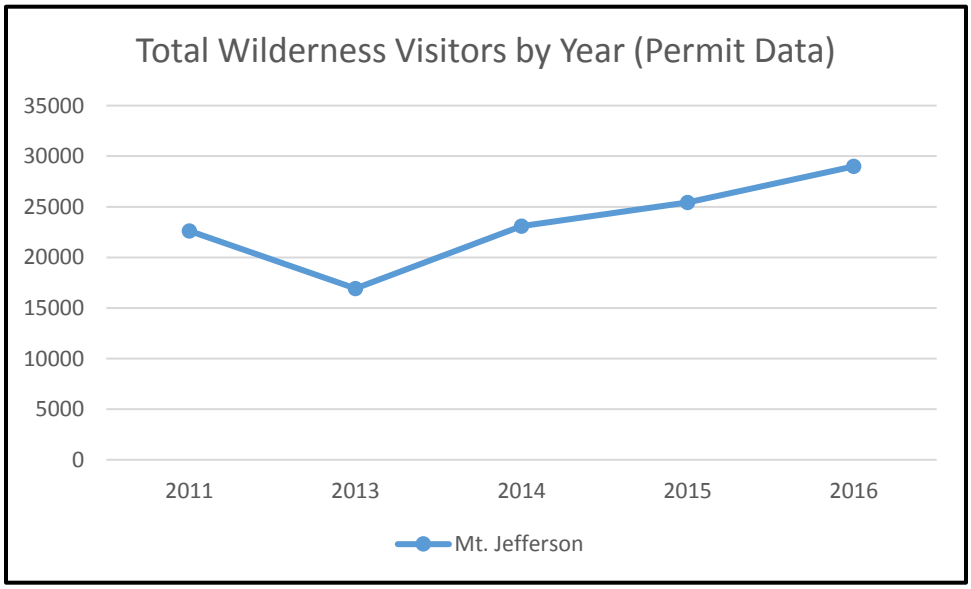


Figure 8: Trend in visitor use in the Mt. Jefferson Wilderness Area from 2011 to 2016. Total number of visitors increased by 28% over that timeframe. 2012 was not included because it does not have accurate information as 14 trailheads did not have any data associated with them.

High Use Areas

There are several areas and trailheads that have been experiencing a heavy increase of use. Jack Lake Trailhead provides access to Canyon Creek Meadows, which is at the base of Three Fingered Jack. This area has faced high use, parking congestion, proliferation of campsites and social trails, and an increase in damage to meadows and riparian areas. Figure 9 shows the use from the early 1990s to 2016.

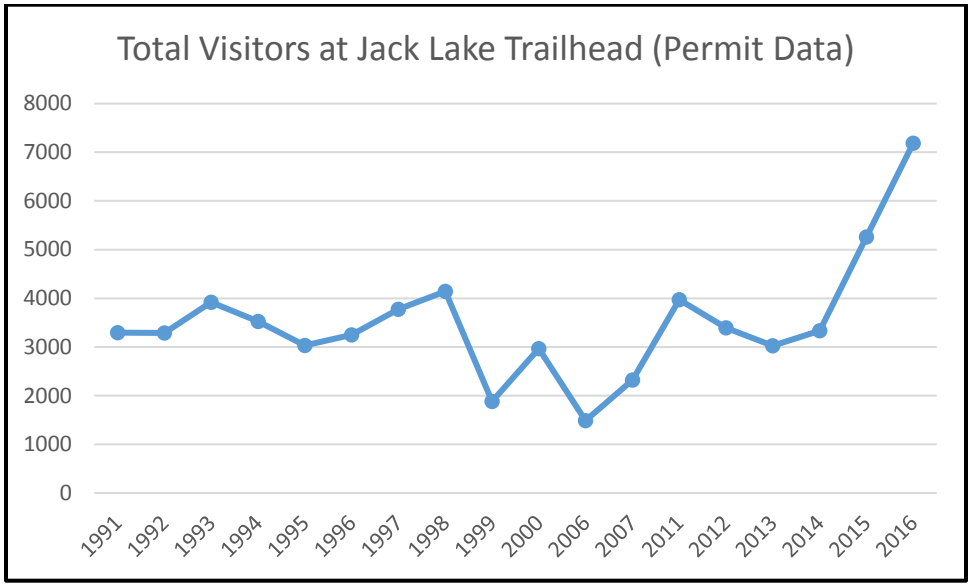


Figure 9: Visitor use on the Jack Lake Trailhead increased 118% from 1991-2016.

Jefferson Park is another area that has experienced a significant increase in use over the past few years. The most popular trailheads for accessing this area are Whitewater, Breitenbush Lake (PCT), and South Breitenbush/Crag. South Breitenbush and Crag trailheads are adjacent to one another and their permits have been collected together and aggregated when compiling permit data. Figure 10, Figure 11, and Figure 12 show the use increases from the early 1990s to 2015 or 2016.

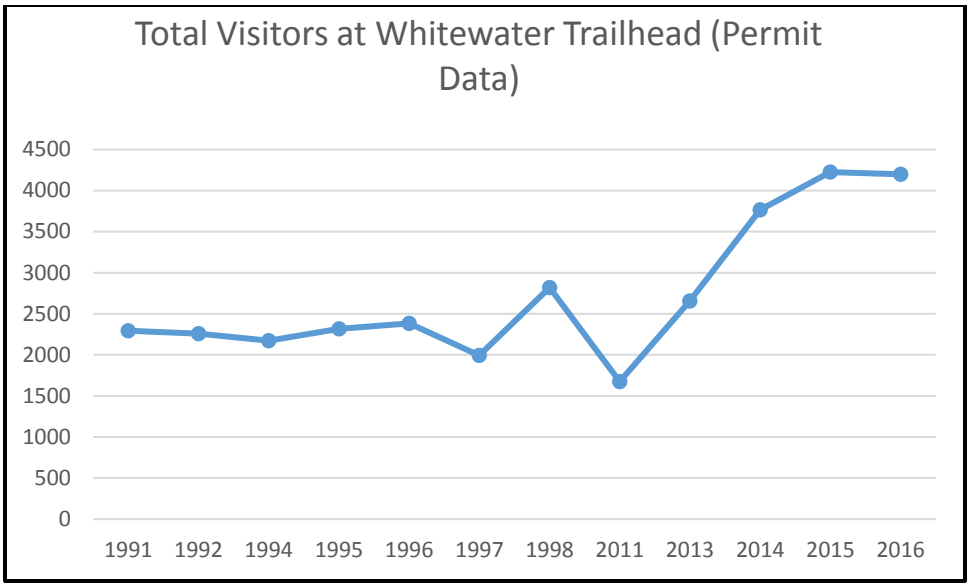


Figure 10: Visitor use on the Whitewater Trailhead increased 83% from 1991-2016.

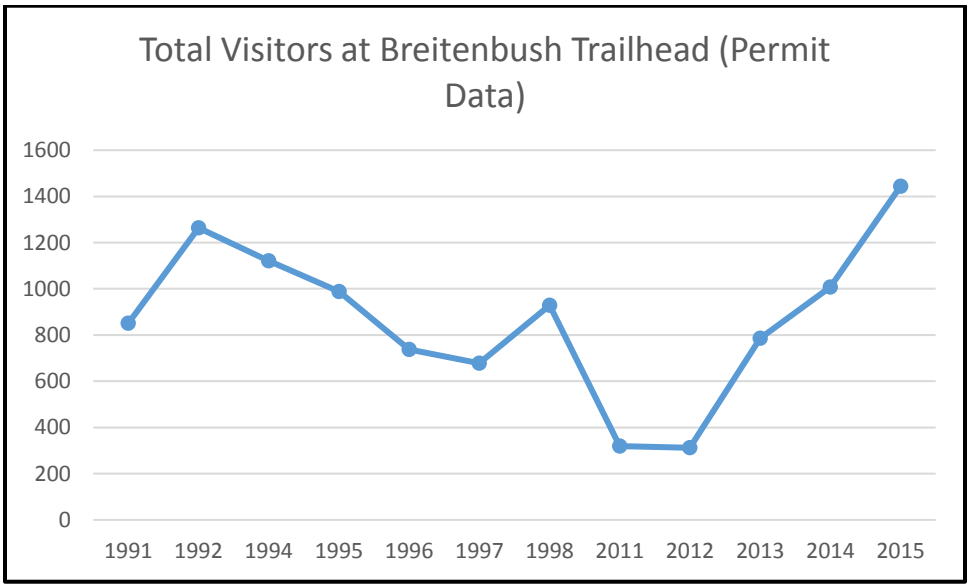


Figure 11: Visitor use on the Breitenbush Lake Trailhead increased 70% from 1991-2015.

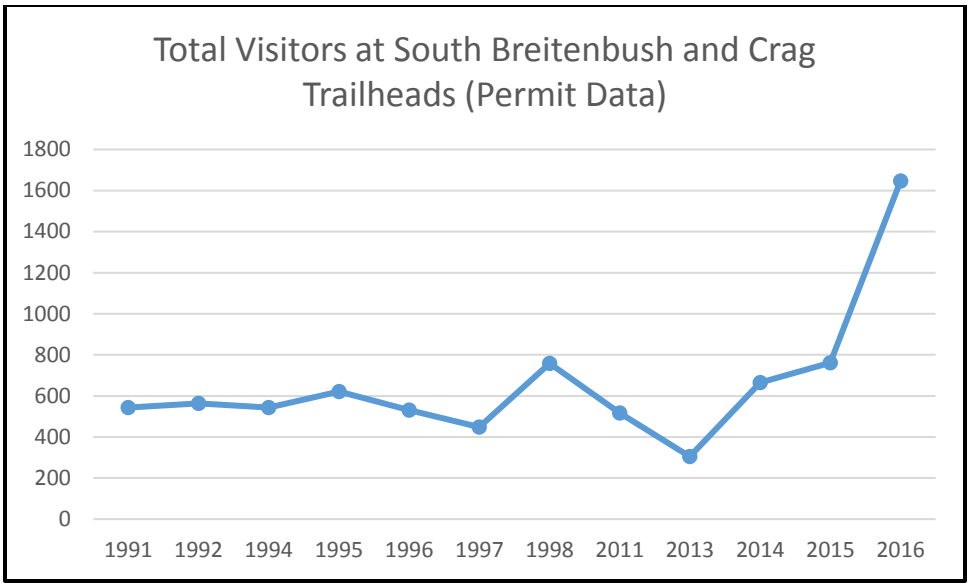


Figure 12: Visitor use on the South Breitenbush and Crag Trailheads increased 203% from 1991-2016.

The season of use in the Mt. Jefferson Wilderness has only been documented when wilderness permits are required (Memorial Day to October 31st). There are no numbers for use outside of these dates. Figure 13 shows the season of use and Figure 14 shows the days of use within the Mt. Jefferson Wilderness.

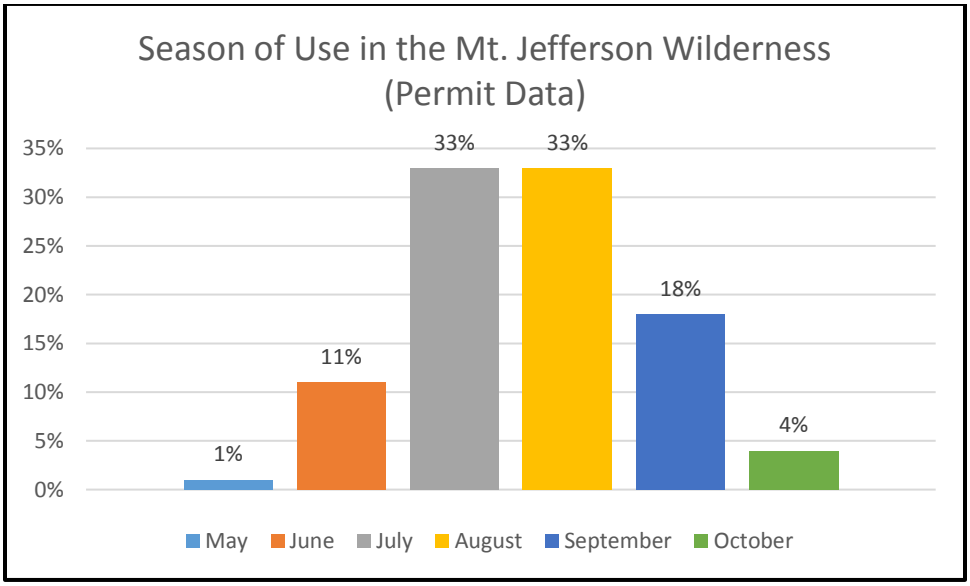


Figure 13: Proportion of use across the months within the Mt. Jefferson Wilderness.

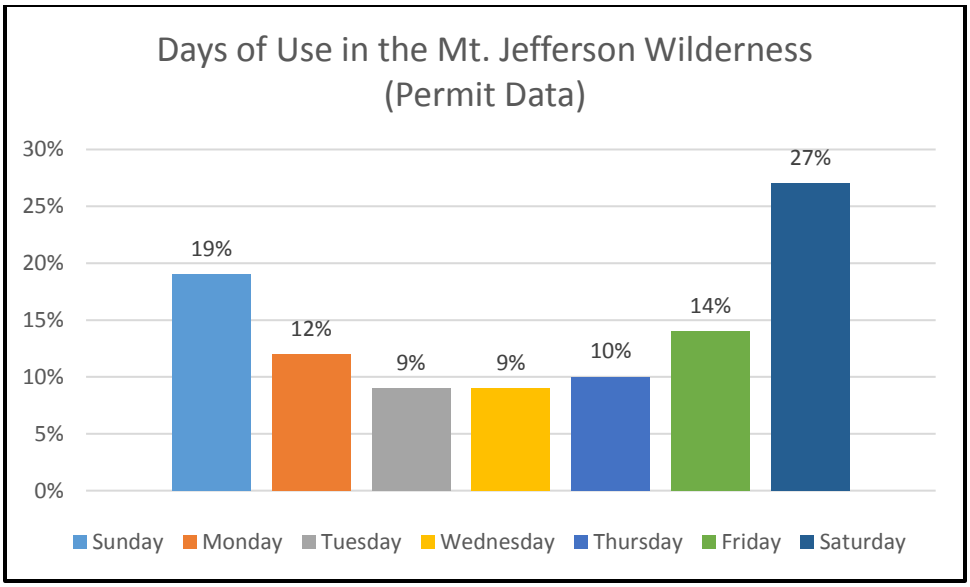


Figure 14: Proportion of use across days of the week in the Mt. Jefferson Wilderness.

The average group size for the Mt. Jefferson Wilderness in 2016 was 2.6 people. Day users represented 41% of the total use in 2016, wilderness-wide, as determined by trailhead permit data (Table 5).

Table 5: Amount of overnight versus day use in Mt. Jefferson Wilderness in 2016.[2]

Mt. Jefferson	Day Use	Overnight Use
Bear Valley	41%	59%
Cabot Lake	29%	71%
Jack Lake	71%	29%
Jefferson Lake	76%	24%
Round Lake	65%	35%
Big Meadows HC	53%	47%
Bingham Ridge	27%	73%
Breitenbush Lake	no data	no data
Cheat Creek	53%	47%
Crown Lake & Roaring Creek	42%	58%
Duffy Lake	20%	80%
Marion Lake	37%	63%
Maxwell Butte	76%	24%
Minto Mt	100%	0%
Pamelia Lake	no data	no data
PCT Santiam Pass	28%	73%
Pine Ridge & Turpentine	62%	38%

[2] The is calculated on use days, which accounts for the number of days people are in the wilderness.

Mt. Jefferson	Day Use	Overnight Use
South Breitenbush & Crag	33%	67%
Triangulation & Triangulation Peak	85%	15%
Whitewater	26%	74%
Woodpecker Ridge	26%	74%
Average	**41%**	**59%**

*"Use days" accounts for the number of days a person is in the wilderness, compared to the visitor use data (Table 3), which accounts for the number of people, not how many days they stayed.

Permit data has shown that the number of people in the Mt. Jefferson Wilderness has been increasing, but there has actually been a decrease in the number of dogs (Figure 15).

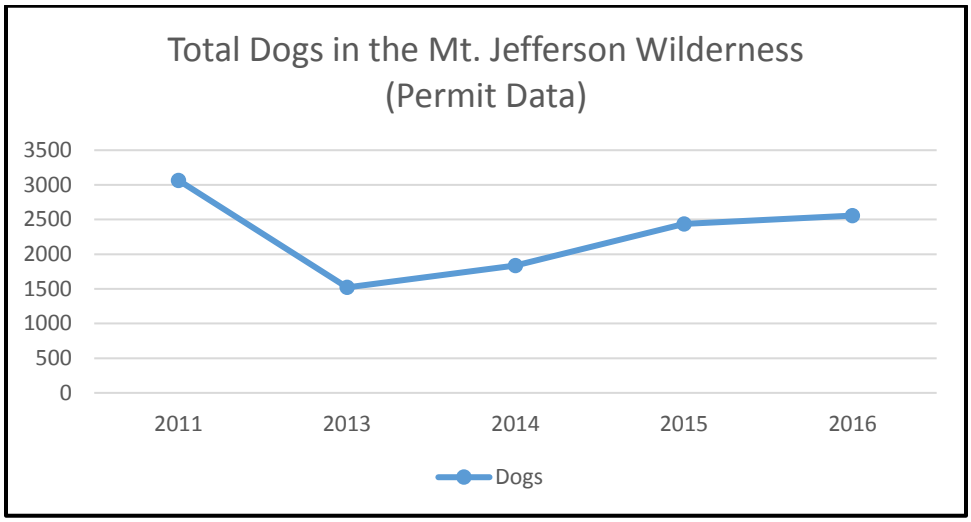


Figure 15: The number of dogs in the Mt. Jefferson Wilderness has decreased 15% from 2011-2016. 2012 was not included as 14 trailheads did not have data associated with them.

Permit data has shown that despite the increase in the number of people, the number of horses entering the Mt. Jefferson Wilderness has actually been on the decline. The reason for this decline is unknown. It could be a direct result of equestrians having a harder time accessing trailheads due to crowds and parking issues, or a general change in visitor use. Figure 16 shows the decrease in horse use.

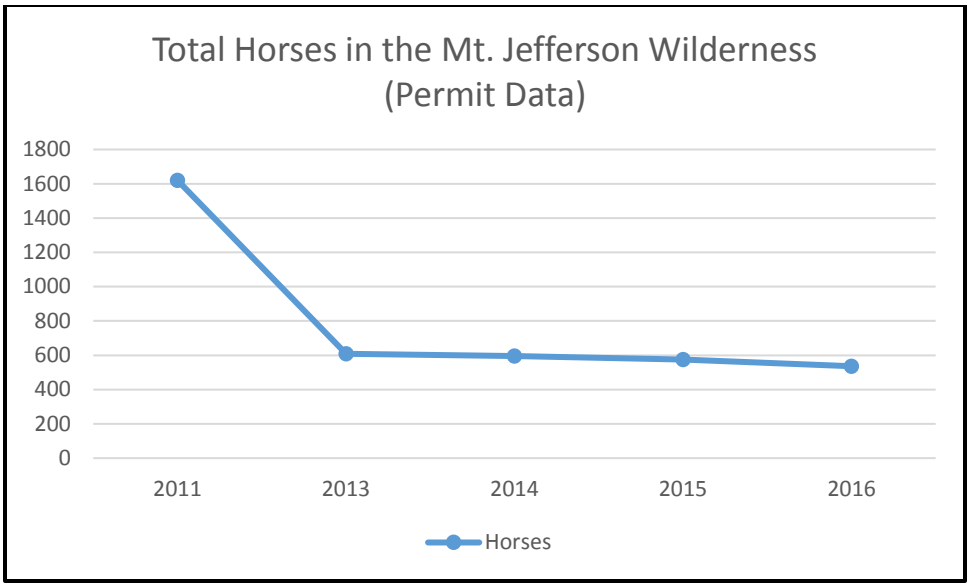


Figure 16: The number of horses in the Mt. Jefferson Wilderness has decreased 67% from 2011-2016. 2012 was not included as 14 trailheads did not have data associated with them.

Solitude Monitoring

Solitude monitoring was completed by Hall and Engebretson (2015) in the Mt. Jefferson Wilderness with a caveat that, "The Minimum Protocol for Monitoring Outstanding Opportunities for Solitude is not meant to determine whether any standard is being exceeded in a wilderness area as per a wilderness management or forest plan." Despite this limitation, the results still provide a baseline of data to compare with forest plans in order to see if encounters are within acceptable levels.

The Forest Plans define trail encounter standard based on several Wilderness Resource Spectrum (WRS) classes, with the highest level of visitation being defined as Class I (Transition). Class 1 of the WROS delineates a condition where a visitor could expect only a 20% chance of encountering more than 12 groups in a day, or put another way, 80% of the time a visitor goes into a transition zone, they see fewer than 12 groups. When a visitor enters a WRS Class II (Semi-primitive) zone, they can expect only a 20% chance of encountering more than 10 groups per day (see Table 32, Appendix A).

The data suggests that 4 of the 6 monitored areas are out of compliance with the forest plan during the weekend/holiday and 2 are within compliance during the week (Table 6 and Table 7). It should be noted that these studies were completed before the 2015/2016 field seasons when visitor use increased more dramatically.

Table 6: Mt. Jefferson Wilderness Weekend/Holiday Travel Encounters (Hall and Engebretson).

Weekend/Holidays					
Monitoring Area	# Days Sampled	Mean People/ Hour	Mean People/ 8-hour day	Mean Groups/ 8-hour day	Forest Plan Standard (groups per day)
Canyon Creek Meadows (II)	5	8.2	65.7	27.7	≤10
Duffy Lake (II)	5	5.1	40.5	14.4	≤10
Jefferson Park (II)	6	11.5	91.7	33.8	≤10
Marion Lake West (II)	5	4.2	33.7	13.0	≤10
Marion Lake East (I)	6	2.3	18.3	6.7	≤12
Pamelia Lake (I)	5	2.4	19.4	6.2	≤12

Table 7: Mt. Jefferson Wilderness Weekday Travel Encounters (Hall and Engebretson 2015).

Weekdays					
Monitoring Area	# Days Sampled	Mean People/ Hour	Mean People/ 8-hour day	Mean Groups/ 8-hour day	Forest Plan Standard (groups per day)
Canyon Creek Meadows (II)	5	3.2	25.6	8.7	≤10
Duffy Lake (II)	5	0.7	5.8	3.5	≤10
Jefferson Park (II)	5	3.5	28.0	13.3	≤10
Marion Lake West (II)	5	1.6	12.7	6.5	≤10
Marion Lake East (I)	5	0.6	4.9	2.9	≤12
Pamelia Lake (I)	5	2.9	23.0	11.1	≤12

Within the Mt. Jefferson Wilderness, all but one area monitored experienced a decline in encounters when comparing 1991-93 to 2013-14 (Table 8). This monitoring was completed prior to the sharp uptick in use after 2014.

Table 8: Comparison of 1991-93 and 2013-14 Weekday Travel Encounter Data, Mount Jefferson Wilderness (Hall and Engebretson 2015).

Weekdays					
Monitoring Area	Monitoring Decade	Number of Days Sampled	Mean Encounters Per Hour	Std. Deviation	Individual Encounters/ 8-hour Day
Canyon Creek Meadows II	1991-3	10	4.4	4.5	35.5
	2013-4	5	3.2	3.3	25.6
Duffy Lake II	1991-3	13	1.7	2.0	13.4
	2013-4	5	0.7	0.8	5.8
Jefferson Park II	1991-3	36	2.7	2.1	21.6
	2013-4	5	3.5	3.0	28.0
Marion Lake West II	1991-3	39	4.6	3.5	36.5
	2013-4	5	1.6	2.1	12.7
Pamelia Lake I	1991-3	33	3.9	3.2	31.2
	2013-4	5	2.9	1.5	23.0

Biophysical Setting

Natural Resource Conditions and Issues

Figure 17: Unburied human waste and toilet paper streamer

The natural conditions within the Mt. Jefferson Wilderness are experiencing degradation in some areas of high use that is correlated to the visitor trends described above. Table 9 displays the work that was completed by Wilderness Rangers, including the number of fires rings naturalized, number of instances of human waste that had to be buried, pounds of garbage packed out of the wilderness, and the number of structures dismantled. The data in Table 9 is not intended to show a trend and can vary based on the level of staffing and what other duties the Rangers have, but it does demonstrate the behavior of some users. Toilet paper and garbage are degrading to the scenery and experience, and concentrations of human waste may lead to environmental contamination, human sanitation and wildlife toxicity concerns.

Table 9: Work completed by Wilderness Rangers in the Mt. Jefferson Wilderness, 2015 and 2016.

Mt. Jefferson Wilderness	Fire Rings Naturalized	Human Waste Buried	Pounds of Garbage	Structures Dismantled
2015	118	301	680	204
2016	265	409	593	181

Campsites

A campsite inventory was completed for the entire Mt. Jefferson Wilderness from 2011 to 2013. Of the 1,074 campsites identified, 55% were within 100 feet of water (638) and 31% were too close to the trail (328) (Figure 18). The Forest Plans states that campsites should be at least 100 feet from water and trails and it is an element of Leave No Trace principles.

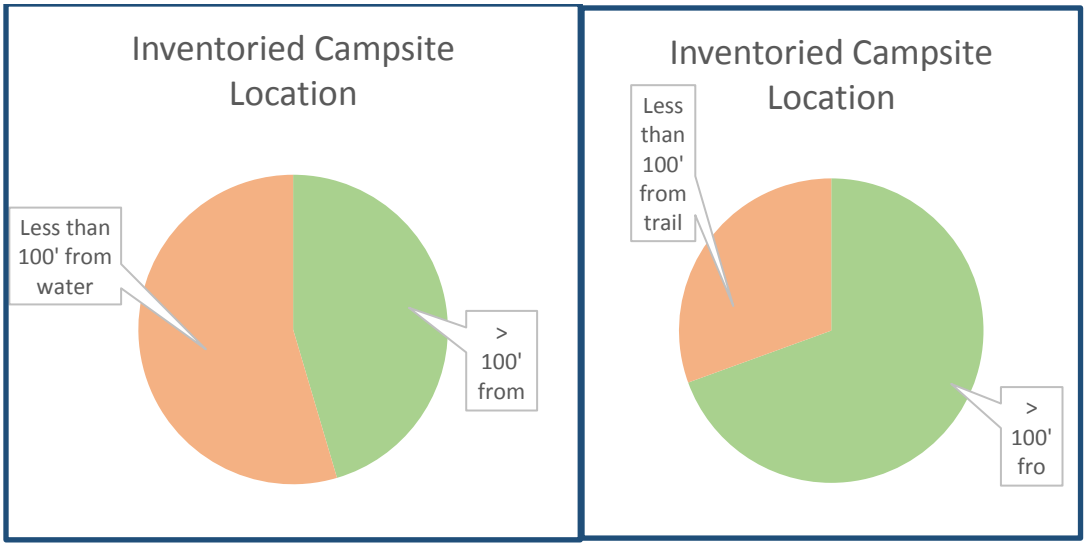


Figure 18: Proportion of 1,074 campsites meeting LRMP guidelines within the Mt. Jefferson Wilderness Area.

User-Created Trails

There has been no comprehensive survey of social trails within the Mt. Jefferson at this time, but in 2010, 2011, and 2016, Wilderness Rangers mapped social trails that they found in their work area. A complete survey of social trails is scheduled for the field season of 2017 to cover the entire Mt. Jefferson Wilderness Area. 14.2 miles of non-system trails have been identified at this time. Table 10 identifies the different classes of social trails that compromise the total miles of social trails. Most are condition class II, which means significant vegetation loss.

Table 10: Miles of User-Created Trail by Class

User-Created Trails	Miles
Trail Class I	3.06
Trail Class II	6.96
Trail Class III	4.1

There are exceptions to these degrading conditions, specifically in the limited entry areas of Obsidian and Pamelia, where conditions have been improving.

Managerial Setting

Condition and Character of Visitor Management Efforts

Standard wilderness restrictions are listed in Appendix B. High use in some areas has resulted in a somewhat complex managerial situation for Mt. Jefferson Wilderness. Management actions were most recently laid out in the 1994 Implementation Plan for the 1990 Wilderness Strategies Project, with slight modifications over the years.

The following is a discussion of the specific management controls in place:

- Late May through October 31, free self-issue permit is required.
- Campfires are prohibited in certain areas:
  - Within ¼ mile of Table Lake, Rockpile Lake, Marion Lake, Ann Lake.
  - Within the area commonly referred to as Jefferson Park.
- Camping is prohibited in certain areas:
  - Between the southwest shoreline of Ann Lake and 100' slope distance of trail #3436 from the outlet of Ann Lake, southeasterly to the rockslide.
  - From the junction of trails #3422 and #3495 along the northwest shoreline of Marion Lake to, and including the peninsula located approximately ¼ mile south from the junction of trails #3495 and #3436.
- Camping is required to be in designated campsites in certain areas:
  - 250' slope distance of the high water mark of the following lakes, unless within 15' of a post designating it as an approved campsite: Duffy, Pamelia, Scout, Bays, Park, Rock, Russel, Wasco, and Square.
  - 250' slope distance of lakes in Jefferson Park area unless at a designated site.
- Stock animals are not allowed to graze or be tethered for more than four hours within ¼ mile of the shorelines of Marion or Ann Lakes.
- The only limited entry area located in the Mt. Jefferson Wilderness is in the Pamelia Lake area. It limits day and overnight entry to 20 groups per day. Only 3 of the groups may be large (9-12 people). For the large groups, the Pamelia area is broken into three smaller areas and only one large group is allowed in each at one time. After the LEA was implemented in 1995, visitor encounters decreased significantly. The 2000 State of the Wilderness Report showed a 23% drop on weekends and a high level of compliance.

Wilderness rangers have a regular presence in the Mt. Jefferson Wilderness with a focus on weekends at Canyon Creek Meadows, Carl Lake, and Square Lake. There has been minimal presence from Volunteer Wilderness Rangers in this wilderness in the past. The majority of Incident Reports written by wilderness rangers for violations were for fire rings too close to water or trails, exposed human waste, garbage, and no wilderness permit.

Mount Washington Wilderness

Social Setting

General Visitor Characteristics and Trends

The Mount Washington Wilderness Area is 54,452 acres and contains one of the largest sheets of lava in the United States. Mount Washington is a 7,794 foot high dissected volcano that overlooks approximately 75 miles of black lava-strewn plains. It also contains a dense forest of lodgepole pine and mountain hemlock and is dotted with 28 lakes and enough wildlife to attract hunters in the fall. There are 8 trailheads that provide access to 43 miles of trails, including 13 miles of the Pacific Crest Trail (PCT), which is the primary route through the wilderness. Table 11 shows the number of visitors from 2011-2016 at each trailhead and Figure 19 shows the visitor use graphically.

Table 11: Total visitors by trailhead within the Mt. Washington Wilderness Area 2011 – 2016.

Mt. Washington	2011	2012	2013	2014	2015	2016
Benson	1,480	1,729	1,912	2,790	3,973	3,623
Fingerboard	16	0	15	7	74	42
Hand Lake	1,035	837	977	864	820	888
Patjens	270	861	649	725	942	790
PCT Big Lake	158	690	852	449	830	808
PCT McKenzie Pass	660	1,086	1,155	1,554	1,608	1,693
Robinson	162	206	313	379	518	398
Tenas	12	5	7	22	28	73
Totals	**3,793**	**5,414**	**5,881**	**6,791**	**8,792**	**8,315**

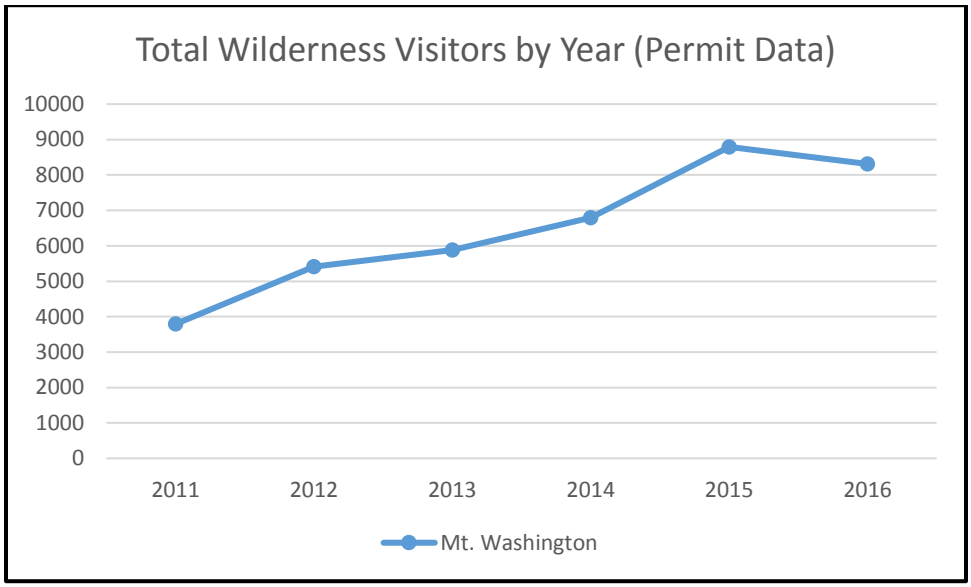


Figure 19: Trend in visitor use in the Mount Washington Wilderness Area from 2011 to 2016. Total number of visitors increased by 119% over that timeframe.

The season of use in the Mt. Washington Wilderness has only been documented when wilderness permits are required (Memorial Day to October 31st). There are no numbers for use outside of these dates. Figure 20 shows the season of use and Figure 21shows the days of use within the Mt. Jefferson Wilderness.

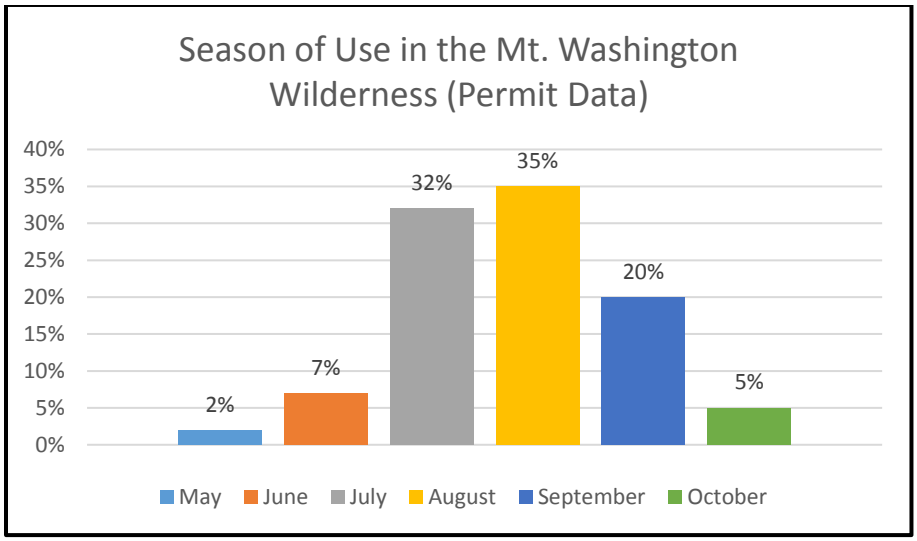


Figure 20: Proportion of use across the months within Mt. Washington Wilderness.

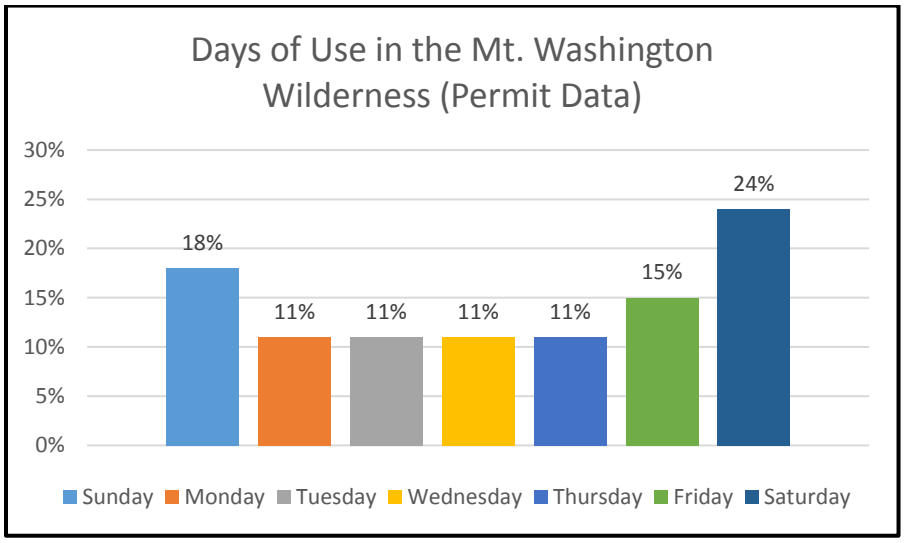


Figure 21: Proportion of use across days of the week in Mt. Washington Wilderness.

The average group size is between two and three people and most users are visiting for the day. Overnight visitation represents approximately 45% of the total use wilderness-wide as determined by trailhead permit data. Permit data shows that in 2016, most trailheads were accessed for day use, while visitors to Cabot Lake trailhead was about half day use. Table 12 shows the day use versus overnight use by trailhead for 2016.

Table 12: Proportion of day and overnight use in the Mt. Washington Wilderness, 2016.

Mt. Washington	Day Use	Overnight Use
Benson	60%	40%
Fingerboard	35%	65%
Hand Lake	66%	34%
Patjens	73%	27%
PCT Big Lake	44%	56%
PCT McKenzie Pass	40%	60%
Robinson	72%	29%
Tenas	43%	57%
Average	**55%**	**45%**

Permit data has shown that the number of people in the Mt. Washington Wilderness has been increasing, but there has also been a corresponding increase in the number of dogs (Figure 22).

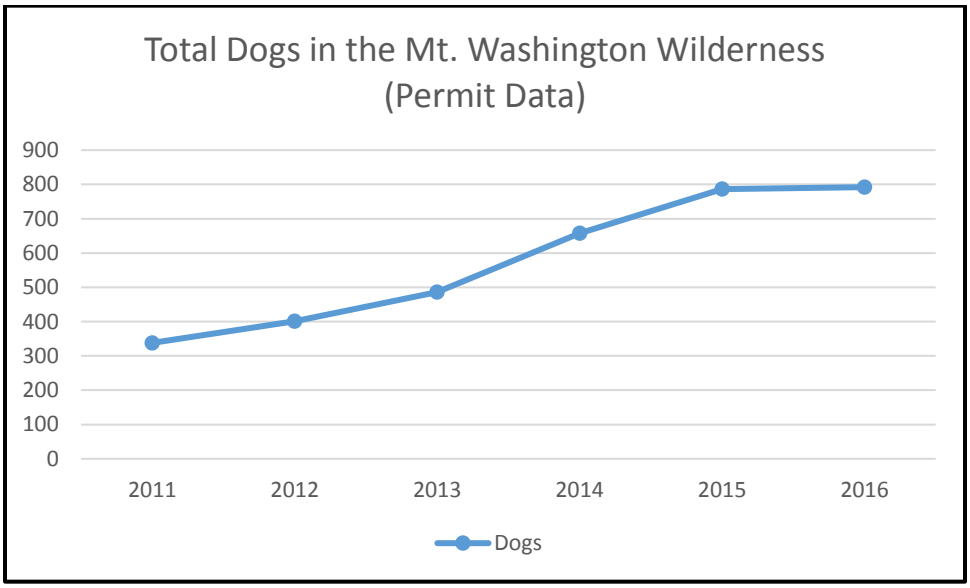


Figure 22: The number of dogs in the Mt. Washington Wilderness has increased 134% from 2011-2016.

Permit data has shown that despite the increase in the number of people, the number of horses entering the Mt. Washington Wilderness has actually been on the decline. The reason for this decline is unknown. It could be a direct result of equestrians having a harder time accessing trailheads due to crowds and parking issues, or a general change in visitor use (Figure 23).

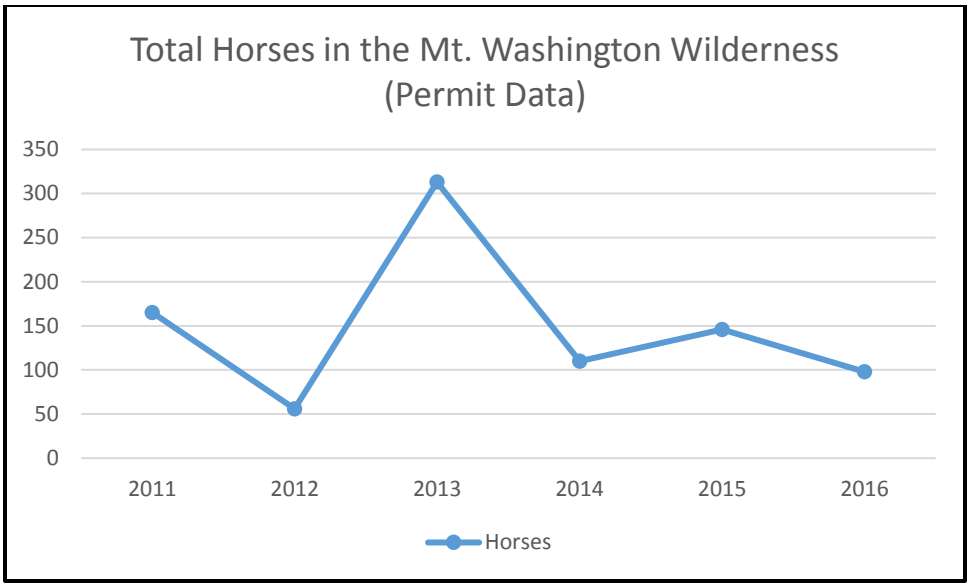


Figure 23: The number of horses in the Mt. Washington Wilderness has decreased 41% from 2011-2016.

Solitude Monitoring

Again, solitude monitoring was not meant to determine whether any standard is being exceeded in a wilderness area as per a wilderness management or forest plan, but the data can be used as a baseline to compare with forest plans to see if encounters are within acceptable levels. Encounter standards are listed in Table 32, Appendix A. For Mount Washington wilderness, solitude monitoring crews collected data in WRS Class II (semi-primitive) as well as Class III (primitive) Wilderness Resource Spectrum (WRS) Class III is defined by a visitor having only a 20% chance of encountering more than 7 groups a day.

The data suggests that, according to these criteria, neither of the two monitored areas are within compliance with the forest plan during the weekend/holiday and one is within compliance during the week (Table 13 and Table 14). It should be noted that these studies were completed before the 2015/2016 field seasons when visitor use increased dramatically.

Table 13: Mt. Washington Wilderness Weekend/Holiday Travel Encounters (Hall and Engebretson 2015)

Weekend/Holidays					
Monitoring Area	**# Days Sampled**	**Mean People/ Hour**	**Mean People/8-hour day**	**Mean Groups/8-hour day**	**Forest Plan Standard (groups per day)**
Trail 4345 (III)	5	2.8	22.5	10.3	≤7
Benson/Tenas (II)	5	6.6	52.8	21.05	≤10

Table 14: Mt. Washington Wilderness Weekday Travel Encounters (Hall and Engebretson 2015).

Weekdays					
Monitoring Area	**# Days Sampled**	**Mean People/ Hour**	**Mean People/ 8-hour day**	**Mean Groups/ 8-hour day**	**Forest Plan Standard (groups per day)**
Trail 4345 (III)	5	0.8	6.4	2.4	≤7
Benson/Tenas (II)	5	6.2	49.5	16.3	≤10

Biophysical Setting

Natural Resource Conditions and Issues

The natural conditions within the Mt. Washington Wilderness are experiencing degradation in some areas of high use that is correlated to the visitor trends described above. Table 15 displays the work that was completed by Wilderness Rangers, including the number of fires rings naturalized, number of instances of human waste that had to be buried, pounds of garbage packed out of the wilderness, and the number of structures dismantled. The data isn't intended to show a trend and can vary based on the level of staffing and what other duties the Rangers have, but it does demonstrate the behavior of some users.

Table 15: Work accomplished by Wilderness Rangers in 2015 and 2016.

Mt. Washington Wilderness	Fire Rings Naturalized	Human Waste Buried	Pounds of Garbage	Structures Dismantled
2015	15	34	62	40
2016	42	26	55	18

Campsites

A campsite inventory was completed for the entire Mt. Washington Wilderness from 2011 to 2013. Of the 62 campsites identified, 61% were within 100 feet of water (38) and 29% were too close to the trail (18) (Figure 24). The Forest Plans require campsites to be at least 100 feet from water and trails.

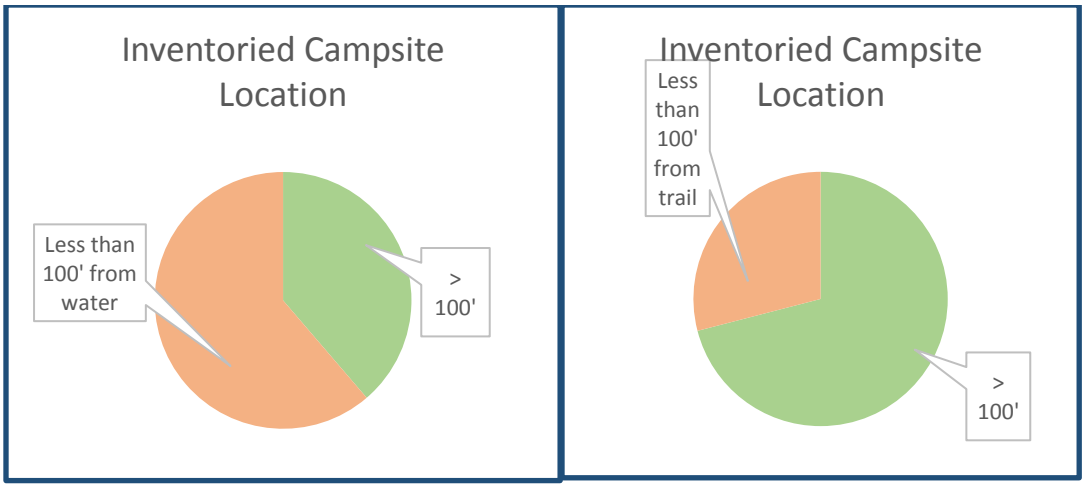


Figure 24: Proportion of 62 inventoried campsites within the Mount Washington Wilderness Area that are in compliance with the LRMP guidelines for distance from water and distance from a system trail.

User-Created Trails

User-created trail mapping was completed in 2016 throughout the Mt. Washington Wilderness and 21.7 miles were identified. These trails are primarily for lake access and often go around the perimeter of the lakes, but are also for campsite and scenic view access and for scaling the higher peaks. 21.7 miles of non-system trails have been inventoried, mostly in condition class I. There are 8 miles of condition class II trails, which signifies significant vegetation loss (Table 16).

Table 16: Miles of User-created Trails by Condition Class

Mt. Washington Social Trails Condition Class	Miles
Trail Class I	13.49
Trail Class II	8.07
Trail Class III	.14

Managerial Setting

Condition and Character of Visitor Management Effort

- Late May through October, free self-issue permit is required.

No additional visitor use management has been implemented in the Mount Washington Wilderness. Standard wilderness restrictions are listed in Appendix B.

Wilderness rangers have a minimal presence in the Mt. Washington Wilderness with a focus on weekends at Benson, Tenas, Hand, and Patjens Lakes. There has been no presence from Volunteer Wilderness Rangers in this wilderness in the past.

Three Sisters Wilderness

Social Setting

General Visitor Characteristics and Trends

The Three Sisters Wilderness Area is the largest in the project area, and the second largest in Oregon, at 283,630 acres. This scenic volcanic landscape contains lava fields, waterfalls, alpine meadows, lakes, streams, lush forests, and 14 glaciers covering South Sister, Middle Sister, North Sister, and Broken Top. The Three Sisters Wilderness is unique in that it preserves a large, continuous corridor ranging from the temperate rainforest valleys of old growth Douglas-fir in the French Pete Valley (at 2250 ft elevation) up to the alpine tundra and glacial landscapes of the Three Sisters Volcanoes (10,358 ft.) and back down to the drier landscape of central Oregon. Oregon State Highway 242 (McKenzie Highway) forms the northern boundary and separates Three Sisters from Mount Washington Wilderness. Highway 46 (Cascade Lakes Scenic Byway) provides easy access to the east side of the wilderness from the population center of Bend. There are 47 trailheads that provide access to 409 miles of trails, with 54 of those miles being part of the Pacific Crest Trail (PCT). Spikes in use at certain areas occurring over the last couple of years may be attributable to local, regional, and state tourism promotions, as well as social media. Table 17 shows the number of visitors from 2011-2016 at each trailhead and Figure 25 shows the visitor use graphically.

Table 17: Total visitors by trailhead within the Three Sisters Wilderness Area 2011 – 2016.

Three Sisters	2011	2012	2013	2014	2015	2016
Black Crater	860	1,620	1,143	464	1,928	2,336
Broken Top	812	1,619	1,294	2,739	4,678	5,351
Chush Falls	629	1,276	145	403	1,345	1,723
Corral Lake	no data	no data	227	165	133	142
Corral Swamp	34	214	59	34	39	18
Crater Ditch	no data	487	459	879	742	1,597
Deer Lake	67	90	82	no data	73	117
Devils Lake	4,276	7,366	5,817	9,310	13,359	15,701
Elk Lake	846	1,500	1,391	2,043	2,383	2,489
Green Lakes	5,561	8,863	8,279	7,518	15,771	21,092
Irish Taylor	122	147	184	596	327	642
Lava Camp Lake	1,698	3,320	4,348	1,380	5,376	6,319
Lucky Lake	1,164	704	1,365	2,121	2,997	3,910
Many Lakes	82	31	80	218	169	163
Millican	120	106	44	131	97	258
Park Meadow	1,532	1,195	761	492	1,286	1,343
Pole Creek	2,048	1,857	837	1,287	3,039	3,247
Quinn Meadow	217	230	157	397	218	266
Scott Pass	308	307	15	181	384	302
Sisters Mirror	949	1,494	1,424	1,716	1,766	2,889
Six Lakes	1,682	2,767	241	2,785	4,033	9,689

Three Sisters	2011	2012	2013	2014	2015	2016
Soda Creek	1,010	1,432	1,411	1,368	2,574	4,732
Tam Rim	3,038	2,404	5,481	3,102	8,767	17,587
Three Creek Meadow	369	355	258	146	492	686
Todd Lake	148	1,135	1,448	2,013	2,320	3,524
Wickiup Plains	2,178	1,941	1,411	418	2,489	1,910
Winopee	212	343	210	277	301	264
Box Canyon	44	43	38	15	21	28
Crossing Way	108	400	147	115	176	101
Lower East Fork	45	71	126	170	90	6
Upper East Fork	52	71	20	39	63	110
Elk Creek	28	44	58	49	42	35
French Pete	705	626	595	847	816	795
Foley Ridge	164	564	376	414	308	360
Horse Creek	95	72	89	93	86	92
Linton Lake	1,445	1,208	1,135	1,721	1,684	1,541
Lower Lowder	32	206	0	0	0	0
Upper Lowder	154	26	196	273	300	168
Obsidian	2,856	1,366	8,539	10,480	11,310	9,143
Olallie	32	258	30	86	86	91
Pat Saddle	187	143	127	251	251	239
Proxy	10,240	10,320	9,520	10,800	9,440	9,600
Rainbow	122	132	124	228	217	284
Rebel	218	275	293	281	287	257
Scott	358	799	761	212	827	795
Separation	148	384	258	130	328	167
South Fork	9	4	14	19	0	10
Totals	**46,999**	**59,816**	**61,021**	**68,406**	**103,418**	**132,118**

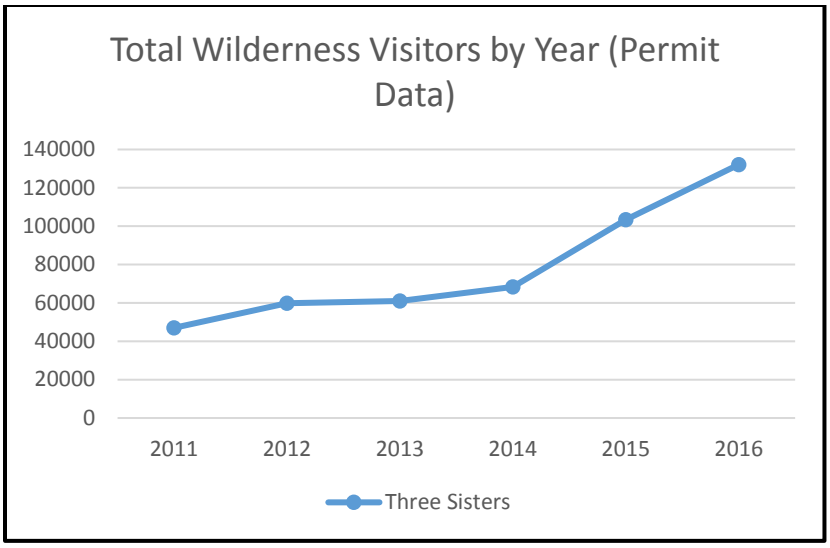


Figure 25: Trend in visitor use in the Three Sisters Wilderness Area shows that numbers of visitors has increased 181% from 2011 to 2016.

The season of use in the Three Sisters Wilderness has only been documented when wilderness permits are required (Memorial Day to October 31st). There are no numbers for use outside of these dates. Figure 26 shows the season of use and Figure 27 shows the days of use within the Three Sisters Wilderness.

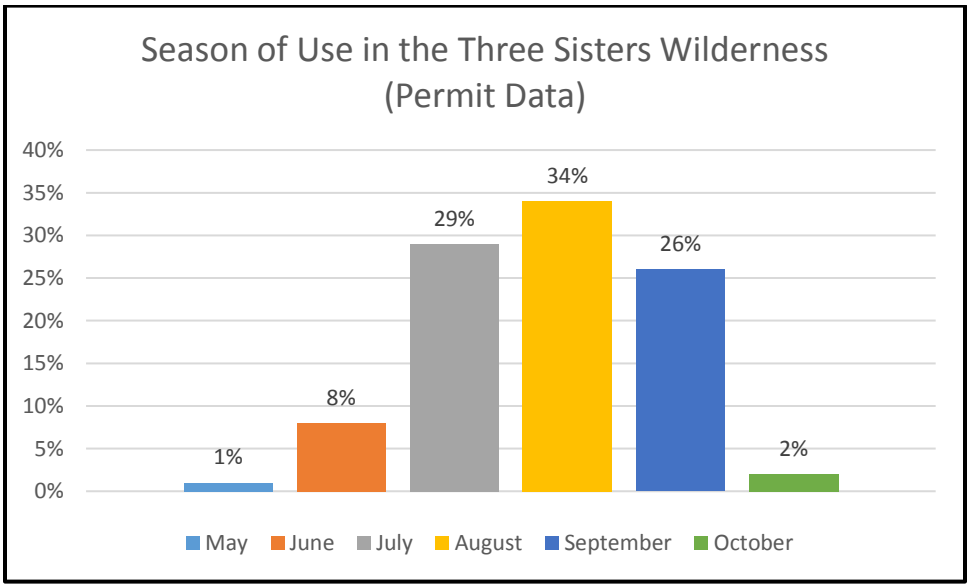


Figure 26: Proportion of use across the months for Three Sisters Wilderness.

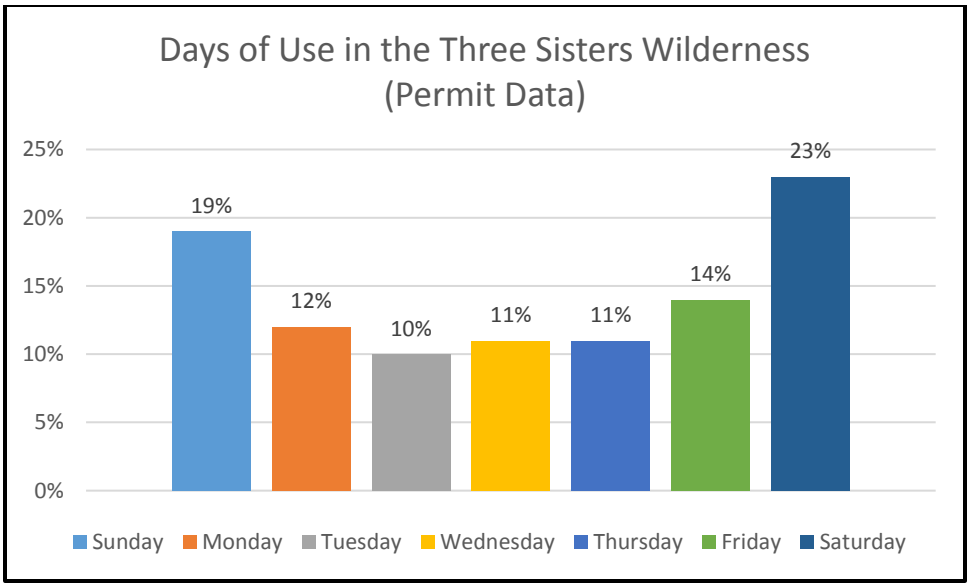


Figure 27: Proportion of use across the days of the week for three Sisters Wilderness.

The average group size for the Three Sisters Wilderness in 2016 was 2.4 people. Day users represented 53% of the total use, wilderness-wide, as determined by trailhead permit data (Table 18).

Table 18: Day use versus overnight use in the Three Sisters Wilderness, 2016.

Three Sisters 2016	Day Use	Overnight Use
Black Crater	96%	4%
Broken Top	80%	20%
Chush Falls	98%	2%
Corral Lake	16%	84%
Corral Swamp	23%	77%
Crater Ditch	79%	21%
Deer Lake	65%	35%
Devils Lake	67%	33%
Elk Lake	42%	58%
Green Lake	74%	26%
Irish Taylor	12%	88%
Lava Camp Lake	37%	63%
Lucky Lake	76%	24%
Many Lakes	71%	29%
Milican	90%	10%
Park Meadow	25%	75%
Pole Creek	17%	83%
Quinn Meadow	58%	42%

Three Sisters 2016	Day Use	Overnight Use
Scott Pass	58%	42%
Sisters Mirror	67%	33%
Six Lakes	60%	40%
Soda Creek	69%	31%
Tam Rim	72%	28%
Three Creek Meadow	41%	59%
Todd Lake	76%	24%
Wickiup Plains	55%	45%
Winopee	31%	69%
Box Canyon	24%	76%
Crossing Way	36%	64%
Lower East Fork	43%	57%
Upper East Fork	86%	14%
Elk Creek	16%	84%
Foley Ridge	12%	88%
French Pete	62%	38%
Horse Creek	34%	66%
Linton Lake	54%	46%
Lower Lowder	no data	no data
Upper Lowder	79%	21%
Obsidian	no data	no data
Olallie	32%	68%
Pat Saddle	77%	23%
Proxy	no data	no data
Rainbow	96%	4%
Rebel	83%	17%
Scott	60%	40%
Separation	12%	88%
South Fork	70%	30%
Average	**53%**	**47%**

High Use Areas

While use is increasing as a whole in the Three Sisters, of particular concern is the area accessed by the Cascade Lakes Highway containing the Green Lakes basin, Moraine Lake, and South Sister. This popular area is served by two primary trailheads, Devils Lake and Green Lakes trailheads, which provide easy access to these areas high use areas.

The parking area for these trailheads are beyond capacity, even on weekdays, and were not designed for the amount of use that they are receiving. Parking along the Cascade Lakes Highway has resulted in dangerous conditions on a highway with a 55 mile per hour speed limit.

Table 19 shows the 2016 number of visitors at these trailheads, along with the percentage of day users. Figure 28 displays the increase in use at each of these trailheads from 1991-2016.

Table 19: Visitors at Green Lakes and Devils Lake Trailheads in 2016.

Trailhead	2016 Number of Visitors	2016 Percentage of Day Users
Green Lakes	17,577	74%
Devils Lake	13,084	67%

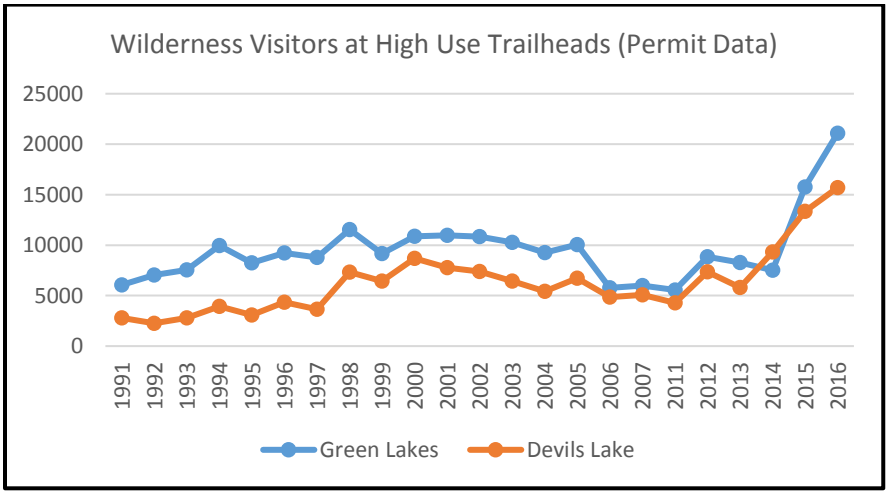


Figure 28: Trend in visitor use from Green Lakes and Devils Lake Trailheads from 1991 to 2016. Total number of visitors has increased 249% at Green Lakes and 459% at Devils Lake.

While the high use areas are becoming more popular, there are other areas that have displayed historically low use that are experiencing significant increases in use. From 2014 to 2016, Tam Rim Trailhead had a 538% increase in use and Six Lakes had a 291% increase in use. Figure 25 shows the change in visitor use at these areas from 1991-2016.

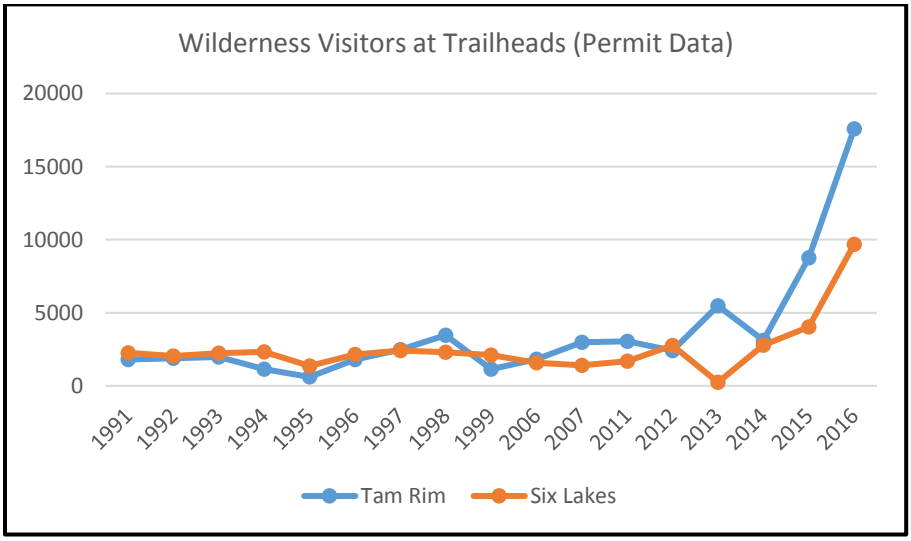


Figure 29: Trend in visitor use from Tam Rim and Six Lakes Trailheads from 1991 to 2016. Total number of visitors has increased 878% at Tam Rim and 329% at Six Lakes during this time.

Permit data has shown that the number of people in the Three Sisters Wilderness has been increasing, but there has also been a corresponding increase in the number of dogs (Figure 30).

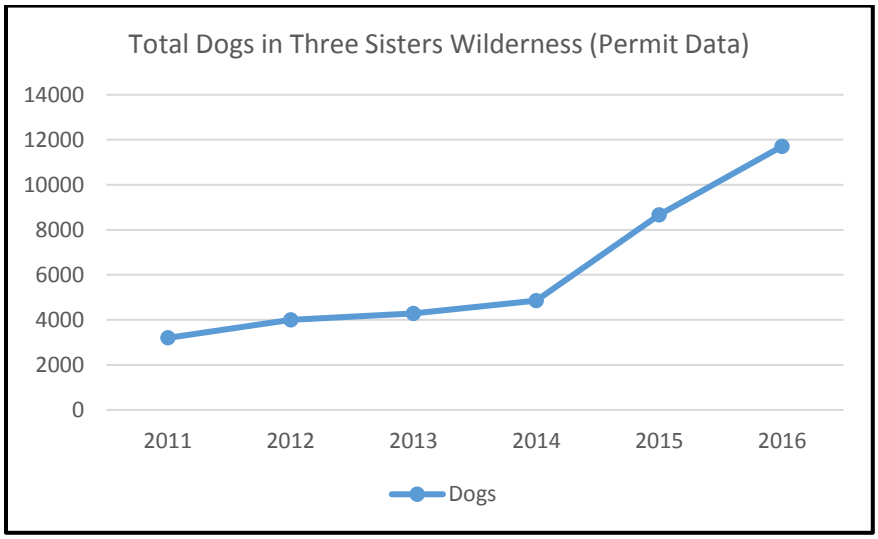


Figure 30: The number of dogs in the Three Sisters Wilderness has increased 266% from 2011-2016.

Permit data demonstrates that the number of horses has been increasing in the Three Sisters Wilderness, although not at the same rate as the number of visitors (Figure 31).

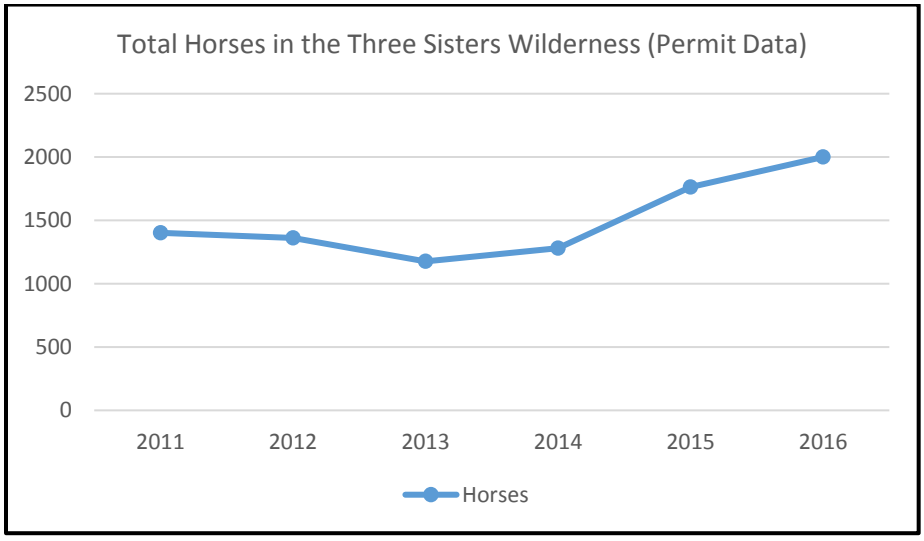


Figure 31: The number of horses in the Three Sisters Wilderness has increased 43% from 2011 to 2016.

Solitude Monitoring

As stated previously, the monitoring was not meant to determine whether any standard is being exceeded in a wilderness area as per a wilderness management or forest plan, but the data does provide baseline data to compare with forest plans in order to see if encounters are within acceptable levels. Encounter standards are listed in Table 32, Appendix A. For the Three Sisters Wilderness sample areas of WRS Class I, II, and III were monitored.

The data suggests that, according to these criteria, 4 of the 9 monitored areas are within compliance with the forest plan during the weekend/holiday and 5 are within compliance during the week (Table 20 and Table 21). It should be noted that these studies were completed before the 2015/2016 field seasons when visitor use increased dramatically.

Table 20: Three Sisters Wilderness Weekend/Holiday Travel Encounters (Hall and Engebretson 2015)

Weekend/Holidays					
Monitoring Area	# Days Sampled	Mean People/ Hour	Mean People/ 8-hour day	Mean Groups/ 8-hour day*	Forest Plan Standard (groups per day)
Green Lakes (II)	5	40.7	325.2	127.6	≤10
Linton Meadows (I)	5	2.6	20.9	9.6	≤12
Spy Lake (III)	6	0.0	0.0	0	≤7
Corner Lake (II)	5	0.3	2.0	0.5	≤10
Mink Lake (I)	5	1.2	9.4	3.8	≤12
Obsidian (I)	10	4.7	37.8	14.6	≤12
South Sister Climb (III)	5	20.7	165.4	78.4	≤7
Sisters Mirror Lake (II)	7	5.8	46.0	20.7	≤10
Wickiup/Mesa (I)	5	4.2	33.6	15.4	≤12

*Because group numbers were not collected in 2013, the average group numbers were derived from trailhead permits for all areas except Green Lakes, Linton Meadows, and Obsidian.

Table 21: Three Sisters Wilderness Weekday Travel Encounters (Hall and Engebretson 2015).

Weekdays					
Monitoring Area	# Days Sampled	Mean People/ Hour	Mean People/ 8-hour day	Mean Groups/ 8-hour day*	Forest Plan Standards (groups per day)
Green Lakes (II)	5	28.7	229.2	90.4	≤10
Linton Meadows (I)	5	1.2	9.6	2.7	12
Spy Lake (III)	5	0.3	2.0	0.8	≤7
Corner Lake (II)	5	0.1	0.8	0.4	≤10
Mink Lake (I)	5	1.2	9.6	4.0	≤12
Obsidian (I)	10	4.0	32.4	12.2	≤12
South Sister Climb (III)	5	12.1	96.6	44.1	≤7
Sisters Mirror Lake (II)	6	3.8	30.8	11.2	≤10
Wickiup/Mesa (I)	6	4.5	35.9	14.0	≤12

*Because group numbers were not collected in 2013, the average group numbers were derived from trailhead permits for all areas except Green Lakes, Linton Meadows, and Obsidian.

Biophysical Setting

Natural Resource Conditions and Issues

The natural conditions within the Three Sisters Wilderness are experiencing degradation in some areas of high use that is correlated to the visitor trends described above. Table 22 displays the work that was completed by Wilderness Rangers, including the number of fires rings naturalized, number of instances of human waste that had to be buried, pounds of garbage packed out of the wilderness, and the number of structures dismantled. Figure 32 shows a typical structure built at a campsite in the wilderness.

Figure 32: Structure and fire ring at Yapoah.

Table 22: Work completed by Wilderness Rangers in Three Sisters Wilderness, 2015 and 2016.

Three Sisters Wilderness	Fire Rings Naturalized	Human Waste Buried	Pounds of Garbage	Structures Dismantled
2015	212	264	704	354
2016	415	570	557	237

Campsites

A campsite inventory was completed for the entire Three Sisters Wilderness from 2011 to 2013. Of the 2,190 campsites identified, 45% were within 100 feet of water (981) and 44% were too close to the trail (521) (Figure 33). The Forest Plans states that campsites should be at least 100 feet from water and trails.

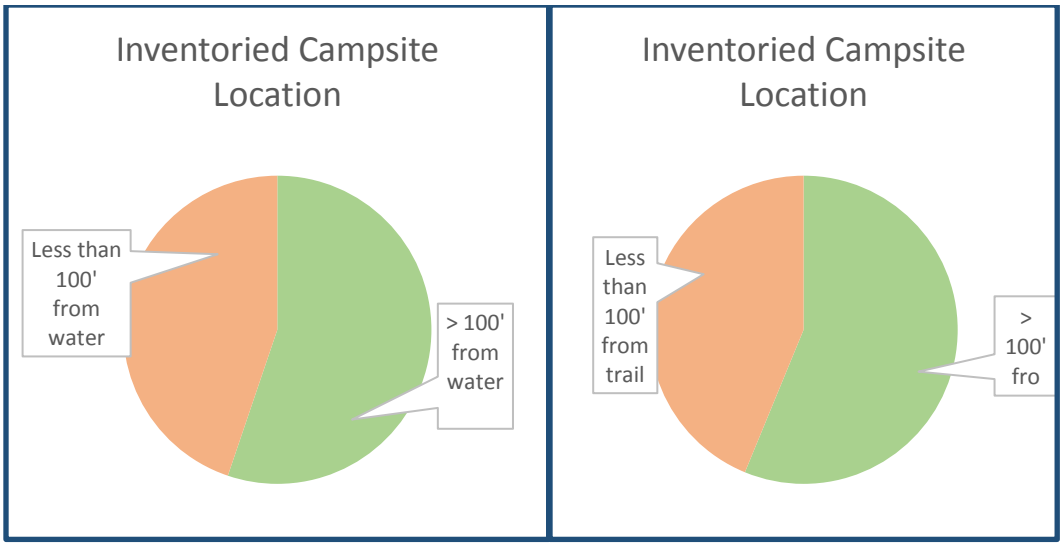


Figure 33: Proportion of 2,190 campsites meeting LRMP guidelines within the Three Sisters Wilderness Area.

User-Created Trails

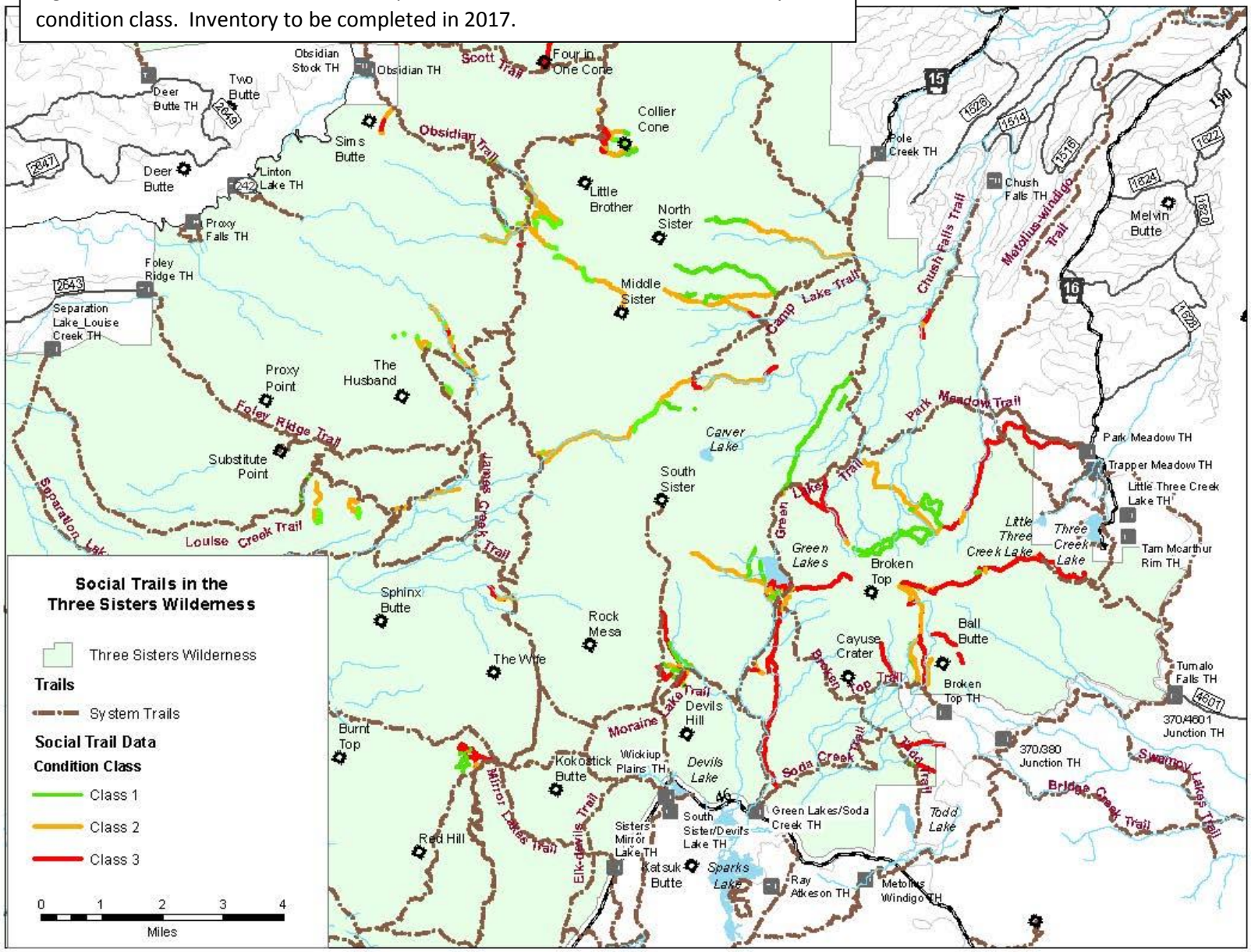
There has been no comprehensive survey of social trails within the Three Sisters Wilderness at this time, but in 2010, 2011, and 2016, Wilderness Rangers mapped social trails that they found in their work area. A complete survey of social trails is scheduled for the field season of 2017 to cover the entire Three Sisters Wilderness Area (Figure 35). The Three Sisters Wilderness has a serious problem with nearly 100 miles of user-created trails (Table 23) already mapped. About 32 miles are condition class III – Complete loss of vegetation compared to surroundings, and/or soil disturbance or erosion obvious and significant; the highest amount of ecological impact for this ecosystem. See Figure 35 for a map.

Table 23: Miles of user-created trails by condition class, partial inventory.

Three Sisters Social Trails	Miles
Trail Class I	32.26
Trail Class II	34.89
Trail Class III	31.72

Figure 34: South Sister Climbing Trail

Figure 35: User-created trails within a portion of the Three Sisters Wilderness by condition class. Inventory to be completed in 2017.



Managerial Setting

Condition and Character of Visitor Management Effort

Standard wilderness restrictions are listed in Appendix B. The following is a list of specific management controls in place in the Three Sisters Wilderness area:

- Late May through October, free self-issue permit is required.
- Campfires are prohibited in certain areas:
  - Within ¼ mile of Golden, North Mathieu, and South Matthieu Lakes.
  - Within the dispersed areas known as Sister-Mirror Lakes, Camp Lake, Chambers Lakes, and Moraine Lake.
  - Within the general area commonly known as Green Lakes Area, Husband/Eileen Area, and Obsidian area.
- Camping is prohibited in certain areas:
  - Within 100', slope distance, of any permanent lake, stream, spring, or system trail in the Husband/Eileen Area, Obsidian Area, and Linton Area.
- Camping is at designated campsites only in these areas:
  - Within the general area commonly known as Green Lakes Area and Moraine Lake Area.
  - Within 250' slope distance of the high water marks at Otter, North Matthieu Lake, and South Matthieu Lake.
- Dogs required to be on leash from July 15th through September 15th on the following trails: Broken Top #10, Crater Ditch Trail, Todd Lake Trail #34, Soda Creek Trail #11, Green Lakes Trail #17, Moraine Lake Trail #17.1, and South Sisters Climbers Trail #36.
- The only LEA within the Three Sisters Wilderness Area is the Obsidian LEA. Originally implemented in 1995, this LEA requires permits for both day (30 allowed) and overnight users (40 allowed), and campfires are prohibited in within the LEA. Prior to implementation of this permit system, the area was being significantly damaged by over-use. The permit system has successfully and significantly mitigated damage to the area.

Wilderness rangers and volunteer wilderness rangers have a regular presence in the Three Sisters Wilderness, with a focus on weekends at the high use areas of Green Lakes, Moraine Lake, Matthieu Lakes, Blow Lake, Doris Lake, Lucky Lake, and the South Sister climbing trail, the Mink Lake Basin, Sawyer Bar and Mini Scott Springs, Sister Mirror Lakes, the greater Linton Meadow area, and the Obsidian Limited Entry Area. Wilderness interns and volunteers staff trailhead stations at the Green Lakes and Devils Lake trailheads, Friday through Monday, greeting visitors and providing information on Leave No Trace ethics and wilderness regulations. These trailhead stations contacted 17,578 individuals over 88 days in the 2016 field season. The majority of Incident Reports written by wilderness rangers for violations were for fire rings too close to water or trails, exposed human waste, garbage, and no wilderness permit.

Waldo Lake Wilderness

Social Setting

General Visitor Characteristics and Trends

The Waldo Lake Wilderness Area is administered entirely by the Willamette National Forest. It covers 36,868 acres and peaks out at 7,144 feet. The majority of this area is forested in fir and western hemlock stands that are dissected by basins, small meadows, rock outcroppings and lakes. There are ten trailheads that provide access to 70 miles of trails.

The Waldo Lake Wilderness has not had permits stocked routinely at trailheads due to a lack of personnel, so there is limited data on visitor use in this wilderness area and tables for number of visitors is not included in this report. Information on visitor use is based on wilderness ranger observations and limited permit data.

Solitude Monitoring

Solitude monitoring completed by Hall and Engebretson in the Waldo Lake Wilderness suggests that the monitored areas were within Forest Plan Standards (Table 24 and Table 25). For the Waldo Lake Wilderness, areas of WRS Classes I, II, and III were monitored.

Table 24: Waldo Lake Wilderness Weekend/Holiday Travel Encounters (Hall and Engebretson 2015).

Weekend/Holidays					
Monitoring Area	**# Days Sampled**	**Mean People/ Hour**	**Mean People/ 8-hour day**	**Mean Groups/ 8-hour day***	**Forest Plan Standards (groups per day)**
Waldo Mt. (III)	5	0.0	0.0	0.0	≤7
Round Lake/ Winchester (II)	5	0.7	5.2	0.8	≤10
Rigdon Lakes Loop (I)	5	0.5	3.9	1.5	≤12

*Because permits were not stocked in 2013, 2.5 was used as the average group size for 2013 data.

Table 25: Waldo Lake Wilderness Weekday Travel Encounters (Hall and Engebretson 2015).

Weekdays					
Monitoring Area	**# Days Sampled**	**Mean People/ Hour**	**Mean People/ 8-hour day**	**Mean Groups/ 8-hour day***	**Forest Plan Standards (groups per day)**
Waldo Mt. (III)	5	0.1	1.0	0.4	≤7
Round Lake/ Winchester (II)	5	0.2	1.3	0.6	≤10
Rigdon Lakes Loop (I)	5	0.7	5.4	2.0	≤12

*Because permits were not stocked in 2013, 2.5 was used as the average group size for 2013 data.

Biophysical Setting

Natural Resource Conditions and Issues

Waldo Lake visitors create the most impact around high mountain lakes through fishing and camping activities. User-created campsites are generally within 100 feet of shorelines, and all lakes with fish populations have user-created trails along the lake shore. Other user-created trails have been created off system trails and lead to isolated small lakes.

Field staff routinely deal with human feces, abandoned trash, tree damage, cached equipment, fir rings and crude shelters. The worst damage and impacts are found at lakes closest to road access.

Managerial Setting

Condition and Character of Visitor Management Effort

Standard wilderness restrictions apply. There are no additional restrictions in place such as campfire setbacks or limited entry areas.

Recreation budget reductions and staffing losses starting in 2011 has prevented the Forest Service from consistently managing its wilderness permit system and collecting compliance data for Waldo Lake Wilderness. The free self-issue permit has not always been made available at the trailheads. There is also a lack of consistent field patrols to contact visitors about wilderness ethics.

Diamond Peak Wilderness

Social Setting

General Visitor Characteristics and Trends

The Diamond Peak Wilderness Area covers 52,459 acres at the 8,744 foot Diamond Peak volcano, straddling the crest of the Cascades. Below the scree slopes surrounding the peak is a dense forest of mountain hemlock, pine, and firs that surround dozens of small lakes.

There are 16 trailheads that provide access to 83 miles of system trails. Fifteen of 83 miles comprise the Pacific Crest National Scenic Trail that passes through the area and near Diamond Peak itself. Mountain climbers scaling Diamond Peak's nontechnical summit often set up base camps at Marie Lake, Divide Lake, and Rockpile Lake.

The following use data compiled for Diamond Peak is based solely on data from the Deschutes National Forest and does not include any trailheads on the Willamette National Forest. Trailheads on the Willamette were not stocked on a regular basis and there is a lack of reliable data from those trailheads. Table 26 shows the number of visitors from 2011-2016 at each eastside trailhead and Figure 36 shows the visitor use graphically.

Table 26: Visitors by trailhead within the Diamond Peak Wilderness 2011 – 2016

Diamond Peak	2011	2012	2013	2014	2015	2016
Crater Butte	no data	68	118	145	189	172
Emigrant Pass	156	264	123	177	284	699
Fawn Lake	217	276	444	214	616	507
Pengra Pass	142	167	226	360	347	351
Snell Lake	69	58	21	28	101	84
Trapper Creek	641	670	785	507	1124	836
Whitefish	152	184	159	140	346	71
Totals	**1,378**	**1,687**	**1,876**	**1,570**	**3,007**	**2,719**

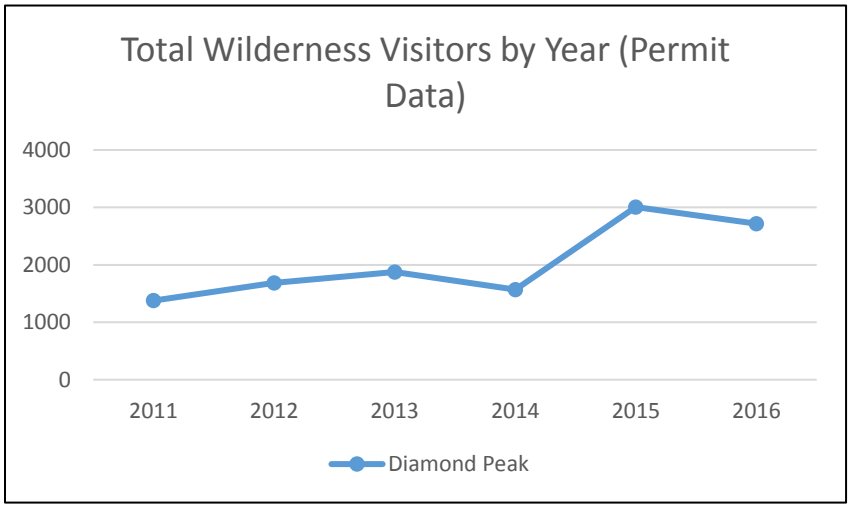


Figure 36: Trend in visitor use in the Diamond Peak Wilderness Area from 2011 to 2016. Total number of visitors has increased 97%.

The average group size for the Diamond Peak Wilderness in 2016 was 2.2 people. Day users represented 70% of the total use, wilderness-wide, as determined by trailhead permit data (Table 27).

Table 27: Day use versus overnight use by trailhead in the Diamond Peak Wilderness, 2016.

Diamond Peak Trailhead 2016	Day Use	Overnight Use
Crater Butte	93%	7%
Emigrant Pass	61%	39%
Fawn Lake	87%	13%
Pengra Pass	63%	37%
Snell Lake	75%	25%
Trapper Creek	55%	45%
Whitefish	58%	42%
Average	70%	30%

Permit data has shown that the number of people in the Diamond Peak Wilderness has been increasing, but there has also been a corresponding increase in the number of dogs (Figure 37).

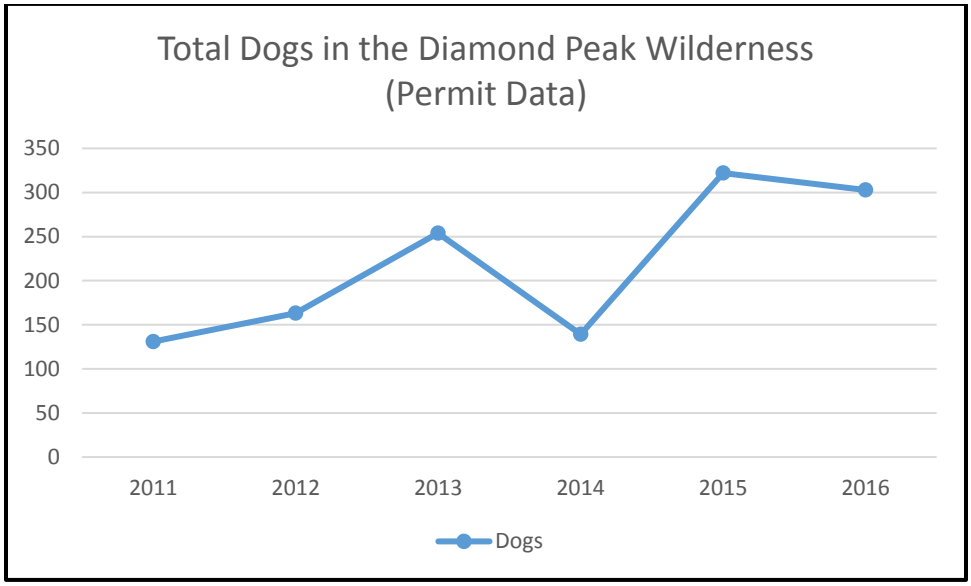


Figure 37: The number of dogs in the Diamond Peak Wilderness has increased 131% from 2011-2016.

Permit data has shown that the number of horses has been fairly consistent in the Diamond Peak Wilderness. Figure 38 shows the modest increase in horse use.

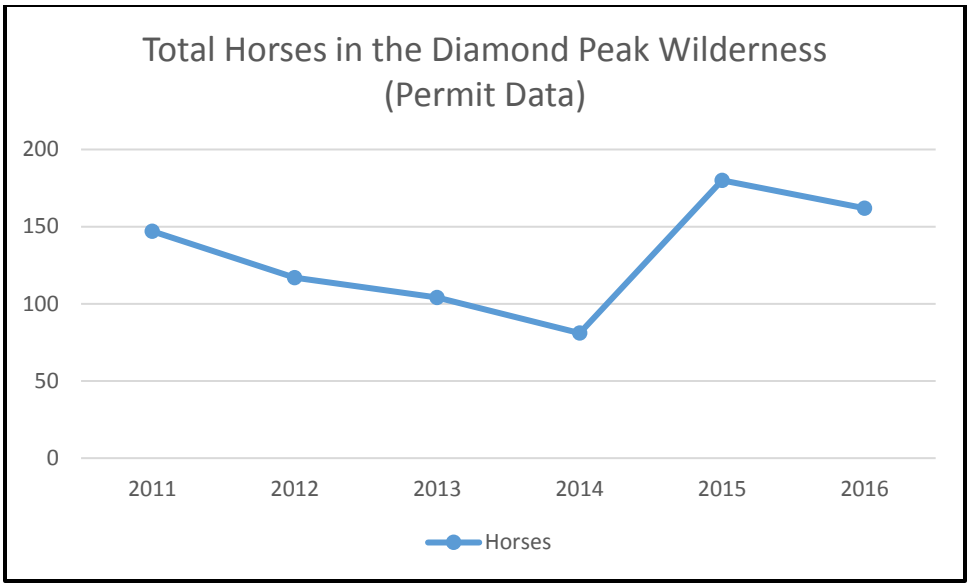


Figure 38: The number of horses in the Diamond Peak Wilderness has increased 10% from 2011-2016.

Solitude Monitoring

Solitude monitoring was not meant to determine whether any standard is being exceeded in a wilderness area as per a wilderness management or forest plan, but it does provide baseline data to compare with forest plans in order to see if standards are within acceptable levels. Encounter standards are listed in Table 32, Appendix B.

According to these criteria, all of the monitored areas appear to be within compliance with the forest plan during both the weekend/holiday and the week (Table 28 and Table 29). It should be noted that these studies were completed before the 2015/2016 field seasons when visitor use increased dramatically. For the Diamond Peak Wilderness, areas of WRS Class I, II, and III were monitored.

Table 28: Diamond Peak Wilderness Weekend/Holiday Travel Encounters (Hall and Engebretson 2015).

Weekend/Holidays					
Monitoring Area	# Days Sampled	Mean People/ Hour	Mean People/ 8-hour day	Mean Groups/ 8-hour day*	Forest Plan Standard (groups per day)
Diamond/Rockpile (III)	5	0.1	0.7	0.30	≤7
PCT (II)	5	1.1	8.5	2.93	≤10
Emigrant Pass (I)	5	0.9	7.2	2.87	≤12

*Because permits were not stocked in 2013, 2.5 was used as the average group size for 2013 data.

Table 29: Diamond Peak Wilderness Weekday Travel Encounters (Hall and Engebretson 2015)

Weekdays					
Monitoring Area	# Days Sampled	Mean People/ Hour	Mean People/ 8-hour day	Mean Groups/ 8-hour day*	Forest Plan Standard (groups per day)
Diamond/Rockpile (III)	5	0.1	0.4	0.20	≤7
PCT (II)	5	0.2	1.9	1.32	≤10
Emigrant Pass (I)	5	0.2	1.5	1.11	≤12

*Because permits were not stocked in 2013, 2.5 was used as the average group size for 2013 data.

Biophysical Setting

Natural Resource Conditions and Issues

The natural conditions within the Diamond Peak Wilderness are experiencing degradation in some areas of high use that is correlated to the visitor trends described above. Table 30 displays the work that was completed by Wilderness Rangers, including the number of fires rings naturalized, number of instances of human waste that had to be buried, pounds of garbage packed out of the wilderness, and the number of structures dismantled.

Figure 39: Tree Damage

Table 30: Work completed by rangers 2015 and 2016 to repair and restore Diamond Peak Wilderness.

Diamond Peak Wilderness	Fire Rings Naturalized	Human Waste Buried	Pounds of Garbage	Structures Dismantled
2015	6	2	7	0
2016	37	28	14	2

Campsites

A campsite inventory was completed for the entire Diamond Peak Wilderness from 2011 to 2013. Of the 220 campsites identified, 68% were within 100 feet of water (149) and 37% were too close to the trail (82) (Figure 40). The Forest Plans state that campsites should be at least 100 feet from water and trails.

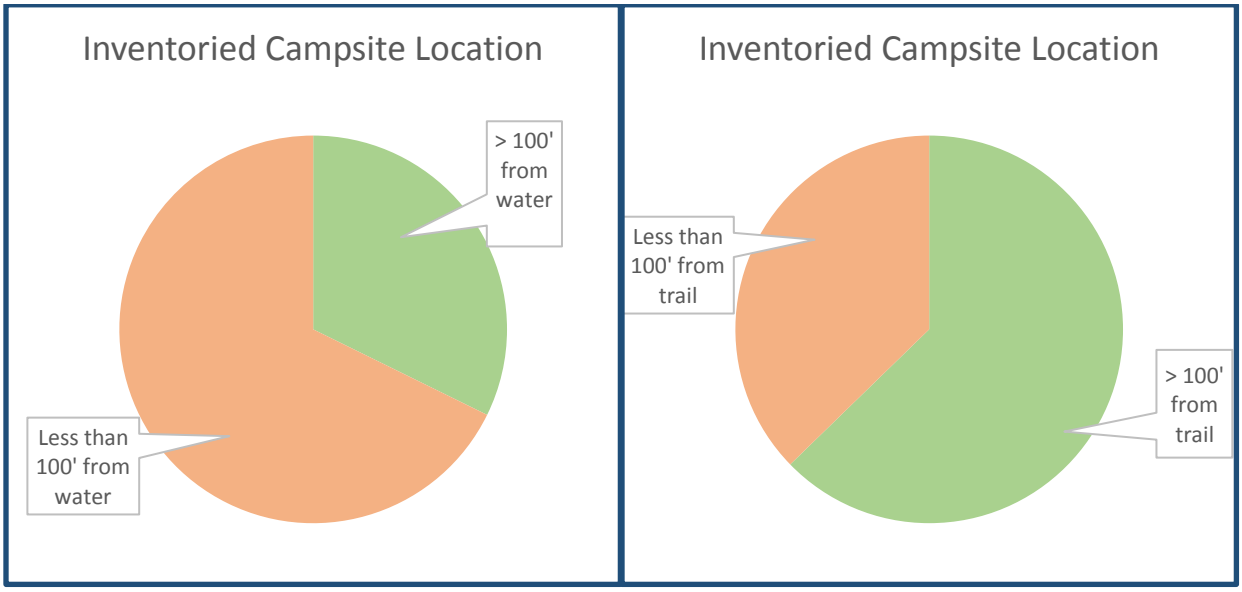


Figure 40: Proportion of campsites meeting LRMP guidelines and LNT principles within the Diamond Peak Wilderness Area.

User-created Trails

User-created trail mapping was completed in 2016 throughout the Diamond Peak Wilderness and 12.92 miles were identified. These trails are primarily for lake access and often go around the perimeter of the lakes, but are also for campsite and scenic view access and for scaling the higher peaks. There are approximately 13 miles of user-created trails inventoried. Table 31 identifies the different classes of social trails that compromise the total miles of social trails.

Table 31: Miles of user-created trail by condition class.

Diamond Peak Social Trails	Miles
Trail Class I	4.09
Trail Class II	8.16
Trail Class III	.67

Managerial Setting

Condition and Character of Visitor Management Effort

Standard wilderness regulations are listed in Appendix B. The Forests have not implemented any additional direct management efforts in the Diamond Peak Wilderness.

Wilderness rangers have a minimal presence in the Diamond Peak Wilderness on the east side of the crest with basically no presence on the west side. The focus has been on weekend use at Fawn, Yoran, and Diamond View Lakes. There has been no presence from Volunteer Wilderness Rangers in this wilderness in the past. The majority of Incident Reports written by wilderness rangers for violations were for fire rings too close to water or trails, exposed human waste, and garbage.

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Appendix A – Wilderness Solitude Monitoring

Oregon State University has been conducting Wilderness Solitude Monitoring in the Three Sisters, Mt. Jefferson, and Mt. Washington Wilderness areas since 1991. The most recent study was conducted during the 2013-2014 field seasons. In the 2015 paper by Dr. Troy Hall and Jesse Engebretson, they compared solitude monitoring data between the field seasons of 1991-1993 and 2013-2014. These results matched permit data that the Deschutes and Willamette National Forests have been collecting at trailheads.

Their 2015 report stated, "Differences in travel encounter rates between 1991-93 and 2013-14 varied from inconsequential to substantial, depending on the specific monitoring area. Our data suggest that travel encounters have greatly increased in the Green Lakes area. Specifically, we documented 520% and 460% increases in mean travel encounters on weekends/holidays and weekdays, respectively. Other areas, such as the Sisters Mirror Lake, had more moderate, but still substantial, increases in travel encounters. Travel encounters in other areas, such as the Obsidian Limited Entry Area and Duffy Lake, remained relatively stable or even decreased" (Hall and Engebretson 2015).

Hall and Engebretson (2015) also used the wilderness solitude monitoring data to check for conformity to Forest Plan Standards and Guidelines within wilderness. The Deschutes and Willamette National Forests each have a Land and Resource Management Plan. These plans recognize that there are areas within Wilderness that provide different opportunities and experiences, and each Wilderness has been divided into Wilderness Resource Spectrum (WRS) Zones. Each zone has its own definition and set of management objectives that make it distinct from other zones (Deschutes National Forest Land and Resource Management Plan 1990).

Table 32defines the standards for trail encounters and campsite encounters in each WRS. It is important to note that the standards in Table 32 refer to "parties" encountered. The forests have interpreted this to mean encounters among groups (e.g., a visitor should expect to encounter fewer than 12 other groups per day 80% of the time in the transition zone) (Hall and Engebretson 2015).

The data collected by Oregon State University for trail encounters and comparing that to Management Plans will be looked at in each wilderness. This data was separated by Weekend/Holiday and Weekday to capture the differences in visitor use. It should be noted that these surveys were completed in 2013/2014, which does not catch some of the significant increases in use that happened in these wilderness areas since that time.

Table 32: Wilderness Resource Spectrum Definitions and Trail and Campsite Encounter Standards (Hall and Engebretson 2015)

WRS Class	Definition	Trail Encounter Standard†	Campsite Encounter Standard†
Transition (WRS Class I)	Characterized by conditions of relatively concentrated visitor use where opportunities for solitude are limited and management activities are highly evident. Those portions of the Wilderness where Transition class management applies are typically staging areas or trailheads. Also included are areas where day use is predominant due to easy access and relatively short trails.	There should be greater than an 80% chance of not more than 12 encounters with other parties per day while on trails.	There should be an 80% probability that 5 or fewer camps are visible from any other campsites.
Semi-primitive* (WRS Class II)	Characterized by predominately unmodified natural environments of moderate to large size. Visitor use may be low, but encounters between users may be fairly common and evidence of human use may be relatively apparent.	There should be greater than an 80% chance of not more than 10 encounters [per day] while on trails.	There should be an 80% probability that 2 or fewer camps are visible or audible from any other camp.
Primitive (WSR Class III)	Areas surrounding existing trails which are essentially unmodified natural environments. Concentration of visitors is low and evidence of human use is minimal.	There should be greater than an 80% chance of not more than 7 encounters with other parties per day while on trails.	There should be an 80% probability that 1 or fewer camps are visible or audible from any other camp.
Pristine (WRS Class IV)	The untrailed areas of Wilderness: these are areas characterized by an extensive, unmodified environment. Natural ecosystem processes and conditions have not been measurably affected by human use. This management area provides the most outstanding opportunities for isolation and solitude and is virtually free of evidence of past human activities. Visitors to Pristine Wilderness areas have only infrequent encounters with other users. Extensive opportunities exist to travel cross-country.	There should be greater than an 80% chance of not more than 1 encounter with other parties per day while on trails.	Camps should not be visible or audible from any other campsites.

* The DNF Wilderness Management Plan includes only three WRS classes: semi-primitive (transition), primitive, and pristine. The semi-primitive class in the WNF and the semi-primitive (transition) class in the DNF have the same encounter standards.
† The Minimum Protocol for Monitoring Outstanding Opportunities for Solitude is not meant to determine whether any standard is being exceeded in a wilderness area as per a wilderness management or forest plan.

Table 33 and Table 34 and Figure 41 and Figure 42, by Hall and Engebretson (2015), show the comparison of travel encounters between 1991-1993 and 2013-2014, both for weekend/holidays and weekday. While the differences in travel encounter numbers show inconsistent change across the monitoring areas in three wildernesses, there are areas that experienced a dramatic increase in travel encounters both on the weekends and weekdays (Hall and Engebretson 2015).

Table 33: Comparison of 1991-93 and 2013-14 Weekend/Holiday Travel Encounter Data (Hall and Engebretson 2015)

Weekends/Holidays					
Monitoring Area	Monitoring Decade	Number of Days Sampled	Mean Encounters Per Hour	Std. Deviation	Individual Encounters/ 8-hour Day
Benson/Tenas II	1991-3	7	4.5	1.4	36.3
	2013-4	5	6.6	3.0	52.8
Duffy Lake II	1991-3	5	4.8	6.2	38.2
	2013-4	5	5.1	4.1	40.5
Green Lakes II	1991-3	17	7.8	3.9	62.3
	2013-4	5	40.7	20.9	325.2
Jefferson Park II	1991-3	20	5.5	3.3	43.7
	2013-4	6	11.5	6.3	91.7
Linton Meadows I	1991-3	8	1.1	1.3	8.8
	2013-4	5	2.6	1.2	20.9
Marion Lake West II	1991-3	29	8.4	6.1	66.8
	2013-4	5	4.2	3.0	33.7
Obsidian I	1991-3	46	5.1	3.8	41.0
	2013-4	10	4.7	1.9	37.8
Pamelia Lake I	1991-3	38	6.7	4.1	53.5
	2013-4	5	2.4	2.1	19.4
Sisters Mirror Lake II	1991-3	11	2.8	1.6	22.2
	2013-4	7	5.8	3.3	46.0

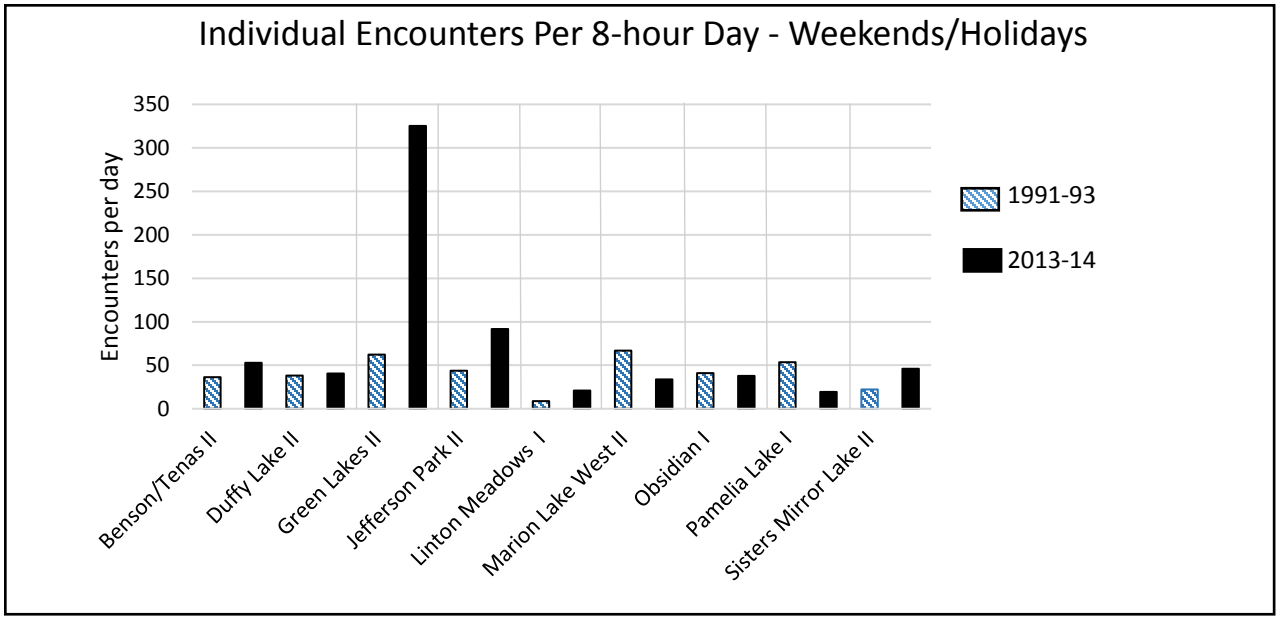

Figure 41: Comparison of Weekend/Holiday Travel Encounters between 1991-93 and 2013-14 (Hall and Engebretson 2015). Encounters per day determined by multiplying encounters per hour by 8 (hour day).

Table 34: Comparison of 1991-93 and 2013-14 Weekday Travel Encounter Data, Three Sisters Wilderness (Hall and Engebretson 2015).

Weekdays					
Monitoring Area	Monitoring Decade	Number of Days Sampled	Mean Encounters Per Hour	Std. Deviation	Individual Encounters/ 8-hour Day
Green Lakes II	1991-3	15	6.2	5.0	49.4
	2013-4	5	28.7	15.9	229.2
Linton Meadows I	1991-3	12	0.6	0.7	5.0
	2013-4	5	1.2	1.0	9.6
Obsidian I	1991-3	45	3.1	1.9	25.1
	2013-4	10	4.0	2.9	32.4
Sisters Mirror Lake II	1991-3	10	2.5	1.4	19.6
	2013-4	6	3.8	4.2	30.8

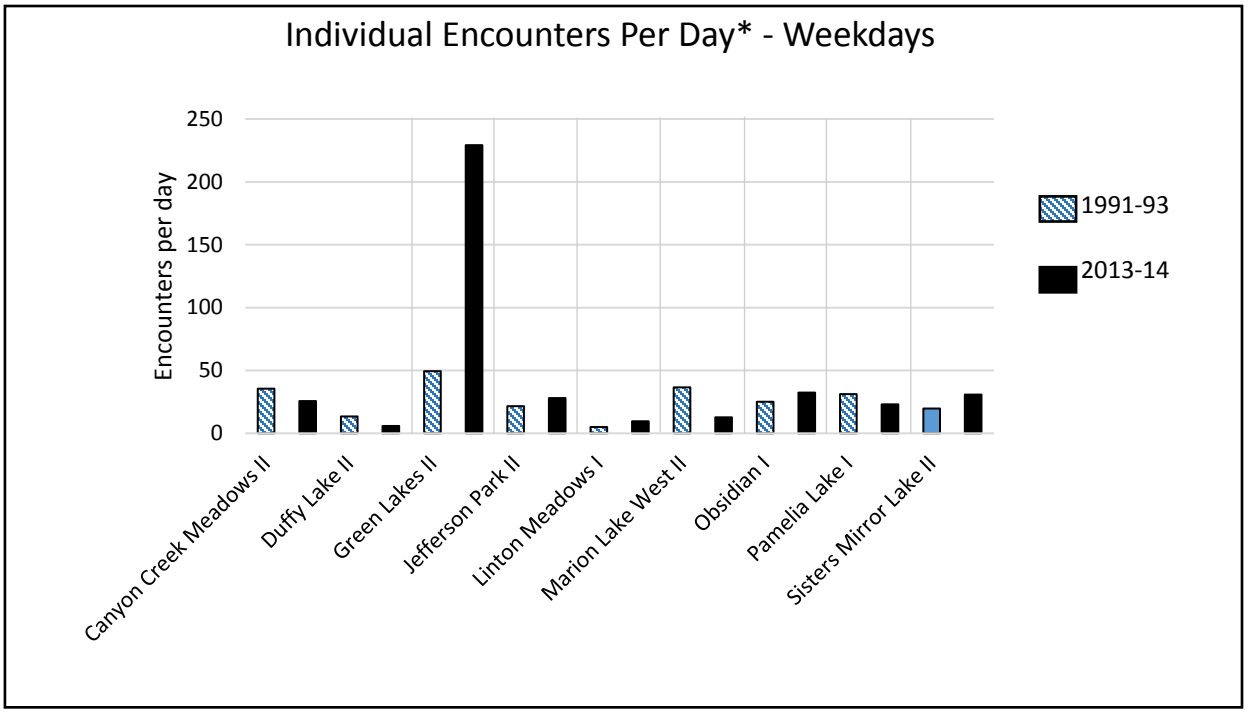

Figure 42: Comparison of Weekday Travel Encounters between 1991-93 and 2013-14 (Hall and Engebretson 2015)

*Encounters per day determined by multiplying encounters per hour by 8 (hour day).

Appendix B – Standard Wilderness Regulations Concerning Visitor Use

The following restrictions and prohibitions are common to all five wilderness areas in the project.

Motorized Equipment

Motorized equipment and equipment used for mechanical transport is generally prohibited on all federal lands designated as wilderness. This includes the use of motor vehicles, motorboats, motorized equipment, bicycles, hang gliders, wagons, carts, portage wheels, and the landing of aircraft including helicopters, unless provided for in specific legislation.

Wilderness Permits

Wilderness permits are required between Friday of Memorial Day weekend and October 31st for all groups that enter the wilderness.

Group Size

Group size is limited to 12 people or fewer. Stock use is limited to 12 head.

Campfires

Building, attending, maintaining or using a fire, campfire or stove, except for stoves fueled with liquid or compressed gas, at the following locations: within 100 feet slope distance of the high water mark of any permanent lake, stream, or spring or system trail is prohibited.

Caching of Equipment

Storing equipment, personal property, or supplies (including geo-caching), unattended, for more than 48 hours is prohibited.

Rehabilitation Sites

Camping or being within an area posted as closed for rehabilitation is prohibited.

Stock Use

Hitching, tethering, picketing, or otherwise securing any pack or saddle livestock within 200 feet, slope distance of the high water mark of any permanent lake, stream, pond, spring, or National Forest System trail is prohibited.